

# SUPPLEMENT.

## The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE.

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

[The MINING JOURNAL is Registered at the General Post Office as a Newspaper, and for Transmission Abroad.]

No. 2585.—Vol. LV.

LONDON, SATURDAY, MARCH 7, 1885.

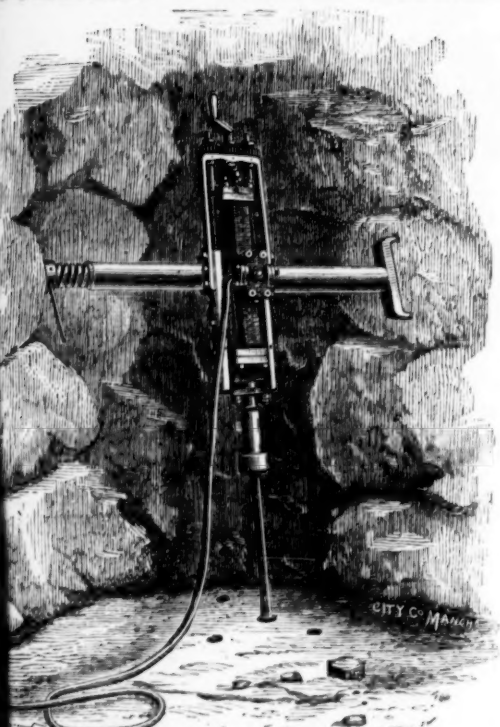
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the Consumption of Air.

JUBILEE EXHIBITION, 1882.

THE PATENT

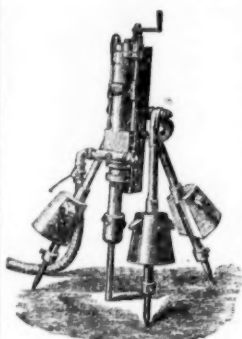
"CORNISH" ROCK DRILL.



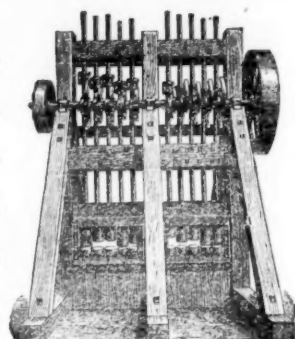
"ADELAIDE" ROCK DRILL.

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IMPROVED PATENT

# INGERSOLL ROCK DRILL

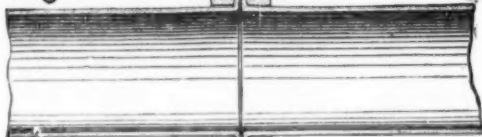
MEDALS  
AND

HIGHEST  
AWARDS.

American Institute, 1872.  
American Institute, 1873.  
London International Exhibition, 1874.  
Manchester Scientific Society, 1875.  
Leeds Exhibition, 1875.  
Royal Cornwall Polytechnic, 1875.

Rio de Janeiro Exhibition, 1875.  
Australia Brisbane Exhibition, 1876.  
Philadelphia Exhibition, 1876.  
Royal Cornwall Polytechnic, 1877.  
Mining Institute of Cornwall, 1877.  
Paris Exhibition, 1878.

Wrought-Iron Steam Tubes.



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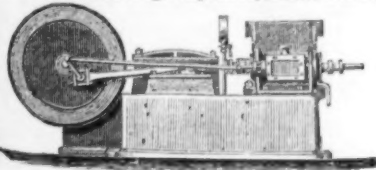
J. G. CRANSTON,

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Silver Medal awarded at Boring Competition, East Pool Mine, Sept. 1883.



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FIRST AWARD.  
SYDNEY, 1879.

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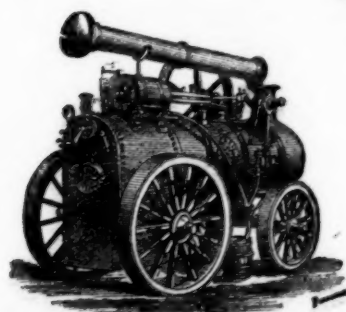
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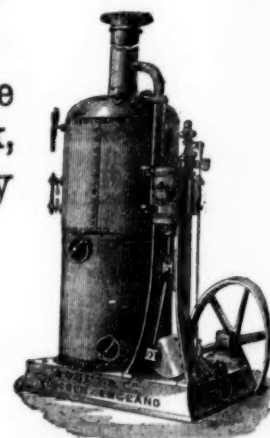
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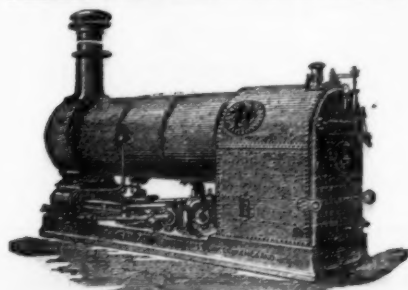


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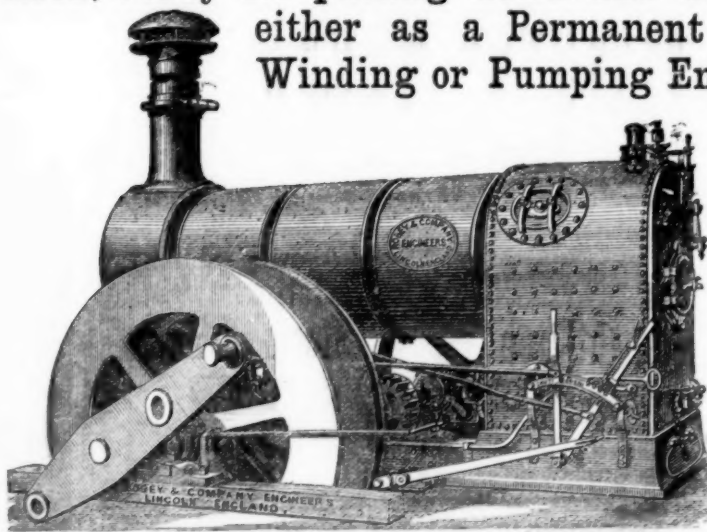
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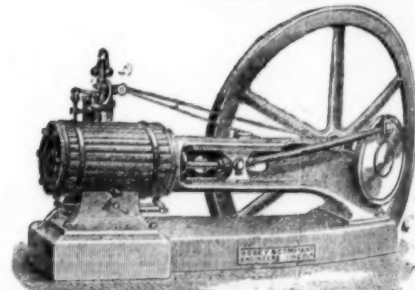


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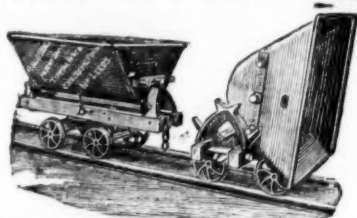
1.—PATENT STEEL END  
TIP WAGONS.



7.—PATENT STEEL MINING WAGONS.



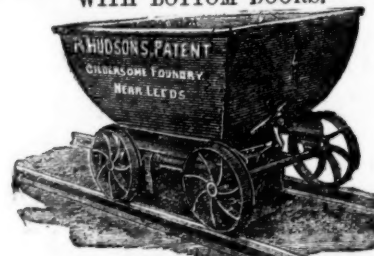
2.—PATENT UNIVERSAL TRIPLE-CENTRE  
STEEL TIPPING TRUCK,  
Will tip either side or either end of rails.



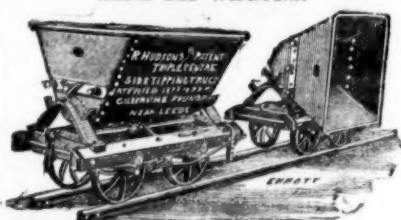
8.—PATENT DOUBLE-CENTRE STEEL  
SIDE TIP WAGONS,  
Will tip either side of Wagons.



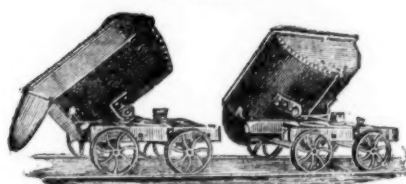
12.—PATENT STEEL HOPPER WAGON,  
WITH BOTTOM DOORS.



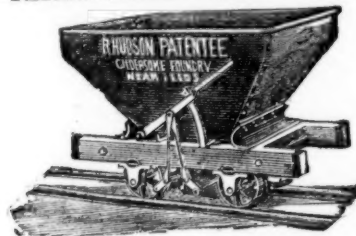
3.—PATENT TRIPLE-CENTRE STEEL  
SIDE TIP WAGONS.



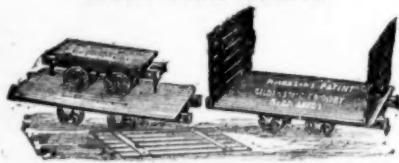
9.—PATENT STEEL ALL-ROUND TIP  
WAGON.



13.—PATENT STEEL HOPPER WAGON.



4.—PATENT STEEL PLATFORM OR  
SUGAR CANE WAGON.



10.—LEFT-HAND STEEL POINT AND  
CROSSING.



14.—SELF-RIGHTING STEEL  
TIP BUCKET.  
(The "CATCH" can also be made SELF-  
ACTING if desired.)



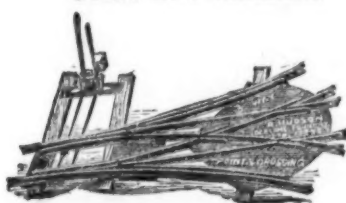
15.—R. HUDSON'S Patent Steel Cage  
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16.—PATENT STEEL WHEELBARROWS.  
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17.—STEEL SELF-CONTAINED  
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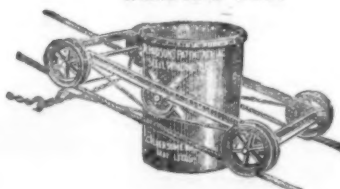
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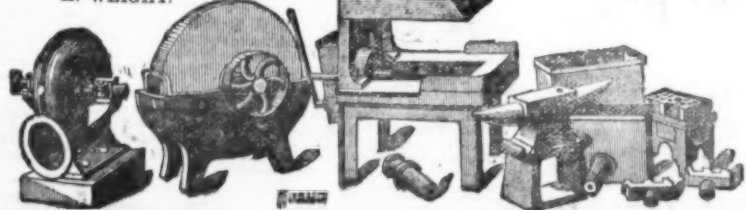
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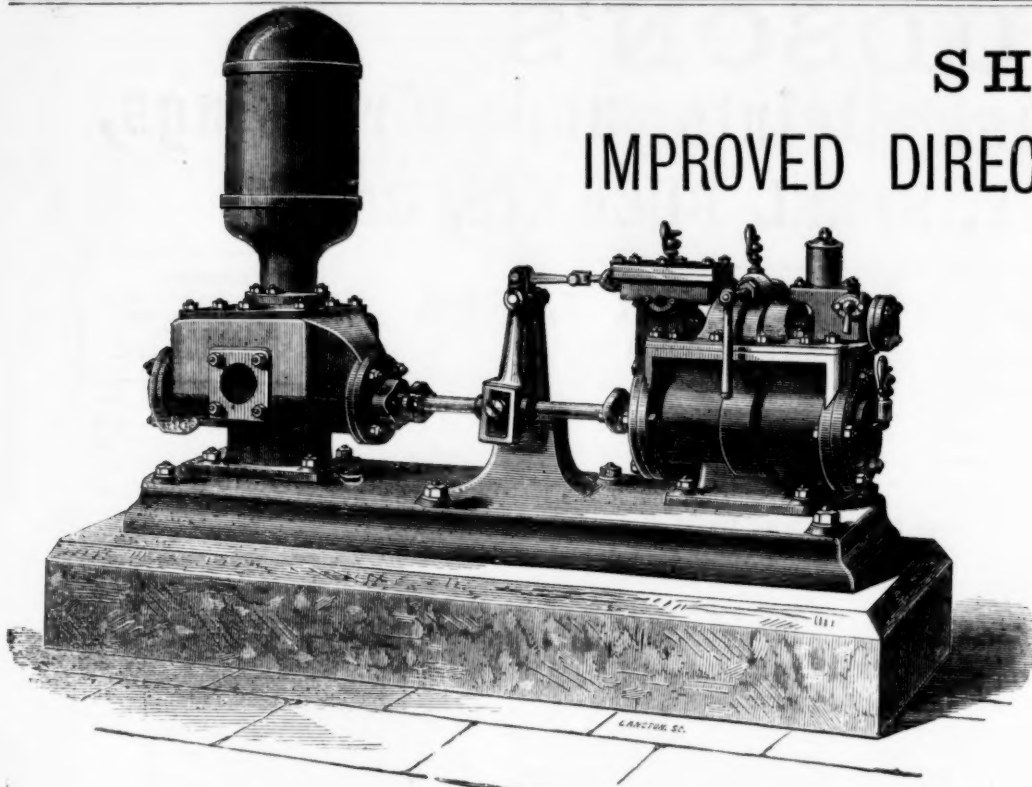
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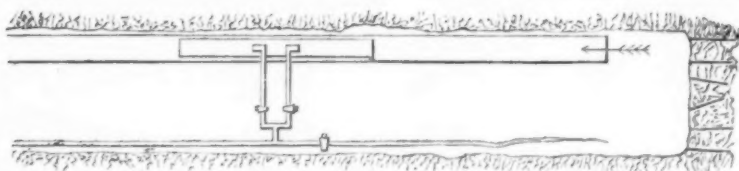
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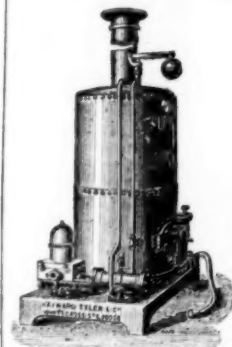
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SIR,—For the size and population of this important section of the British Empire there is no other spot on the face of the earth that has within its gold career (not yet 34 years) had such a direct influence on the advancement and general prosperity of England and its dependencies as this colony.

From the earliest days of settlement, when Batman and Fawcner, in 1837, settled on the banks of the Yarra Yarra, now called Melbourne, and the Henty's at Portland, even prior to that, there has been an air of independence and progressive spirit displayed that has seldom, if ever, been evinced by any other settlement under the British Crown or in the world.

The discovery of gold in 1851 on Ballarat set the then small community in the highest state of commotion. All sorts and conditions of men flocked to the new El Dorado, and were rewarded with varied successes. The spirit of enterprise was abroad, and nearly every able-bodied man had his hopes bent on the discoveries of gold. It was not only that gold had been discovered on Ballarat in such unparalleled quantities, but other fields were soon opened in other parts of the colony—Mount Alexander, Bendigo, Clunes, Beechworth, Ovens, Melvor, Maryborough, Ararat, Blackwood, Gipp's Land, and various other places were developed that have been the means of laying the foundation of cities, towns, and industrial communities of such proportions, and based on such solid foundations of success, that has never been witnessed before, nor ever likely to be again in any other part of the world.

The result of these discoveries induced an influx of population of enterprising spirits, who were mostly prepared to undergo hardships and privations in the search for gold to which they had been before unaccustomed. Energy and determination enabled them to overcome obstacles which under other circumstances would have been deemed insurmountable, and the consequences have been that a stream of new wealth has been flowing from that country to England in the shape of gold in gold dust, bars, and coin, that has had a marked effect on the financial, trading, and commercial prosperity of this country.

The united product of Victoria and other Australian colonies since 1851 may be taken at 300,000,000, of which Victoria produces two-thirds, or an average of nearly 10,000,000, annually. During the first decade the production was far in excess of later years, not only because more men were then engaged in the occupation, but because the facilities of acquiring it from the shallow alluvial workings were easier than it is now.

Gold mining has now developed into a settled industry, that requires skill, intelligence, and capital judiciously united under economical direction for its profitable development, and anything tending to promote its increased supply should be considered in the light of promoting a public good.

The *Times* in a leading article some time since most aptly illustrated the value of the production of gold, and the importance of Victoria as one of the chief sources of its supply. It said—"Victoria is one of the world's principal gold fields. Her gold harvests circulate over the whole earth. A very large part of human concerns is ruled by them. On the fruitfulness or the sterility of the Victorian gold mines it, in a great measure, depends whether a clerk's salary in Whitehall or a marshall's pay in Berlin shall mean so much more or less. Gold is a measure of the material interests of the globe. Whatever affects its production at one of the main headquarters, as in Victoria, is of universal concern."

No sounder truism or logical reasoning ever appeared in the *Times* than in the above remarks on the value of Victoria's gold supply. If they have not already they should be copied by the Australian Press as an instance of the attention now being given by the leading English journals to the value of our gold supply.

There has been and is now amongst some writers and authorities on finance, trade, and commerce a disposition to treat with indifference the prime factor of the world's progress—gold, without having probably given the subject the due consideration which its importance demands. Many persons appear to labour under a delusion that gold can be acquired, or its supply increased, by some process of legerdemain, under the auspices of special financial operations not yet sufficiently explained to be intelligible.

Although financial trading and commercial operations may accumulate or concentrate gold that is in circulation, its operations do not increase the supply of new gold for the benefit of the industrial communities.

An increased supply of gold can only be obtained from one source and by one process, and that is by gold mining. The true philosopher's stone is quartz, the mother of, or matrix, chiefly containing the precious metal.

Victoria contains over 3000 quartz reefs proved to be auriferous, and hundreds of alluvial leads, or ancient river beds, of auriferous gravel; their length, extent, and value can only be guessed at.

Great and profitable as the yield of gold has been up to now there is in all probability an era of future prosperity dawning upon the mining industry in Victoria that will awaken an intelligent and lively interest in other countries and nations beyond Australasia.

As the *Times* truly says "her gold harvests circulate over the whole earth." So also will the improved prospects of her future gold supply gladden the hearts of tens of thousands who know not the colony, and its effects will be to quicken the pulse of trade and commerce, and enliven the industries of Great Britain.

There is an amount of information from late reports of several of the leading gold fields that is of such especial value to the future prosperity of the colony, and to finance, trade, and commerce in England, that its importance can scarcely be appreciated except by those who have a knowledge of the districts where these important discoveries have been made, and the almost unlimited extent of auriferous country that is being opened out for future working, and the large and permanent increase it will give to our gold supply.

In that extensive area of country lying between Creswick, Clunes, Talbot, Smeaton, and Daylesford, there appears to be developing a network of alluvial leads of such vast extent that if only moderately productive will provide profitable employment for an army of gold miners for years to come, besides that other gold belts of enormous extent await future development.

In that valuable geological report of Mr. Reginald A. F. Murray to the Minister of Mines descriptive of the Loddon Valley, the Clunes and adjacent gold fields is some interesting information. After a description of the Loddon Valley he says:—"The next auriferous belt is the most important in the colony—perhaps in the world. Within parallels about 5 miles apart, and extending north by west for a distance of 80 miles, are situated the gold fields of Durham, Beninyong, Sebastopol, Ballarat, Creswick, and Kingston to the south of the basaltic plains of the Loddon Valley, and forming for an unbroken gold bearing belt 30 miles in length. To the north of Edgington, on the production of the belt north of the plains to shallow ground are Kay's diggings, Tarnagulla, and Inglewood. On the next belt to the westward are the gold fields of Clunes, Majorca, Caribbrook, and Jones Creek, besides intermediate workings, for a considerable length of the course of this belt the silurian rocks are covered by tertiary accumulations and basalt.

The last group of auriferous belts to be referred to is, perhaps, next in importance to the Ballarat belt, and includes within a total length of 100 miles by a width of 5 miles the gold fields of Bookwood, Soaradale, Smythesdale, and Haddon, south of the main divide, and on the north thereof, and also of an intervening area of exposed granite are the workings of Mount Grenock, Talbot Amherst, Maryborough, Timor, Donnelly, Goldaborough, Molingut, McIntyre, Wehla, and Wedderburn, forming an almost unbroken chain of gold workings nearly 70 miles in length."

When it is considered that on the Ballarat Sebastopol deep leads containing the golden point or main bed of the district with its tributaries on a direct line of about 4 miles of the course of deep ground produced upwards of twenty millions sterling, what may not be expected to be produced in the future from the scores of

miles of alluvial beds now tested and their course in a measure almost ascertained.

The Creswick and Kingston districts have for some time been famous with their rich mines, such as the Ristori, Lone Hand, Madame Berry, and other mines, and now the Hepburn and Smeaton district is commencing to develop mines which will apparently vie with them in wealth.

Alluvial mining had for some time suffered a diminished attention in consequence of the deep leads having been traced from the shallow depths to the boundaries of private property, which unfortunately surrounded the gold fields, and from inadequate mining on private property laws. Private property owners having become more alive to the advantages of gold mining and enterprise in this direction taken another turn, there has been lately a large amount of legitimate and judicious prospecting that has developed a large extent of auriferous country, and a number of very valuable gold mines, that will give large returns in the future and add greatly to our gold supply.

THOMAS CORNISH,  
Author of "Our Gold Supply: Its Effects on Finance,  
Trade, Commerce, and Industries."

## COPPER MINING, NEW SOUTH WALES.

SIR,—A gentleman of scientific attainments, well known in the old world, and possessing a far larger practical knowledge of the subject than I do, has kindly handed me the following remarks on some of the principal copper mines out here, all of which he has visited, and can, therefore, speak with some authority on. Speaking personally, I think, perhaps, he hardly does justice to the Mount Hope Mine, but then possibly I may be unduly biased in its favour from knowing the very great ability of its principal shareholder and director—Mr. Kelly—who is also, I believe, the largest shareholder in the Great Cobar mine, my experience, paid for very dearly, being that an able man will make a mine pay well that the ordinary run of managers would run into hopeless debt.

Another very successful mine also (not referred to) is the Burrage, whose principal director and purser is Lewis Lloyd, M.L.A. for Bathurst, and which, although only opened about five years back, is rapidly making the fortunes of the two or three lucky proprietors:—

"In sympathy with the depressed and deplorable state of the home metal market the shares of colonial metalliferous mines are at present declining, and exhibit but little animation. The bulk of the tin in Tasmania and New South Wales, being alluvial or obtained from wash dirt covered by floors of basalt, is consequently affected only to the extent that the diminution in the price has affected the profits. In the case of alluvial tin mines the profits are, as a rule, so great that even at the current low rates satisfactory dividends can be earned, but in the case of lode tin, where the deposits are capricious and the production entirely dependent upon the employment of bad and extremely dear and unsatisfactory labour, the mines can only at present prices be carried on at a loss. This being so it is not surprising that lode tin mining companies in Queensland and New South Wales are at a discount, and many mines are rapidly approaching extinction. With perhaps one or two exceptions lode tin mining has not in these colonies been profitable.

"In the case of copper, a few old-established and well-conducted mines in South Australia still continue at work, but unless the prices of bars improve, the depth and consequently its difficulty and cost of producing the ore must inevitably determine the existence of some of these old and well known mines.

"In New South Wales, despite the disadvantages under which the existing mines are placed, the protracted droughts, the heavy expensive land and railway carriage, most satisfactory progress has been made not only in the amount of copper produced but in the all-important work of opening up large reserves of ore.

"At the Great Cobar Copper Mine an immense deposit has been thoroughly opened out, and 50 years' consumption of ore proved. The quality of Cobar ore is for Australia—where, as a rule, rich ores prevail—poor, while the fractionable percentage of bismuth that it contains diminishes the value of the copper bars to a considerable extent.

"No copper company in Australia have shown more energy or skill in developing its mine than the Great Cobar Company. Difficulties of no ordinary magnitude have been successfully overcome, satisfactory dividends have been paid, and magnificently equipped works, and a large township now stands where a few years ago a few solitary sheep grazed. At these works 16 furnaces are kept steadily at work, and as the bulk of the ores are sulphurets the consumption of timber for reducing and smelting purposes is very great.

"The necessities of such a company soon devastate large tracts of country of its timber, and large areas of land have already been denuded of the open forest which originally covered it. To overcome the uncertainty and the ever-increasing expense of procuring timber supplies, the directors with commendable wisdom and characteristic enterprise recently laid down some miles of a light tram road over which the wood fuel is drawn by means of locomotives. Even with such advantages the necessity of providing and maintaining a supply of from 60,000 to 70,000 tons of wood fuel per annum from a sparsely timbered country could not fail to be a source of anxiety to the directors.

"The ores in this large deposit are in depth a low class of sulphurets. At present working from the 54 ft. level, and with the aid of the higher grade ores of the upper levels the average of the ores smelted does not exceed 12 per cent. These ores unfortunately contain a fractional percentage of bismuth, the presence of which materially affects its value, and from its want of conductivity unfits it for electrical purposes, for which absolute purity is required.

"With characteristic energy the directors have spent large sums in experiments with a view to eliminate this impurity. They have expressed their willingness to give 10,000, to anyone who would enunciate a successful process of a practicable nature that would eliminate the bismuth from the ores in process of reduction, but hitherto without success.

"The more pressing question of fuel supply has very properly occupied their attention, and experiments have for some time been made to reduce the consumption of timber fuel. In the lower levels the ores gradually diminish in grade or purity. They are poor sulphurets, and this class of ore treated by the usual reduction furnaces would consume increasing quantities of wood fuel, which, on the other hand, would require to be conveyed from ever-increasing distances. The outlook therefore was not of a bright or encouraging description; however, in the experiments referred to, advantage has been taken of the presence of an excess of sulphur in the ore to induce combustion, and a modification of the old Spanish furnace, combined with some of the latest improvements of the Pacific smelter, has been adopted, and to this Holman's process has virtually been put into practice in order to produce a regulus of (Sv) 50 per cent in one operation, and by the oxidation of the sulphur contained in the ore aided by the addition of a little fuel. This process we have not had the pleasure of inspecting on account of the dry state of the country, and the consequent discomfort of travelling over hundreds of miles of flat bush destitute of verdure. It has, however, so far given satisfaction, and the directors, satisfied that a material reduction in the quantity of fuel will be effected as well as a decided reduction in the time required to treat the ores, have given orders to erect a complete set of Cupola furnaces, which will soon be in active operation.

"The process roughly sketched above has, I understand, been patented in the Colony, but we fail to see on what grounds a patent was granted, and the process being (so far as we have been able to discover) a modification, if not an actual copy, of the old and well known processes for the reduction of low grade copper sulphurets referred to.

"The improvement in the manipulation of the poor Cobar ores will undoubtedly enhance the value of the property, while the rapid extension of the Great Western Railway to Bourke into a narrow gauge branch to Cobar will materially benefit the mine, hampered as it has been by a long, tedious, and expensive land carriage, that has absorbed a large proportion of the gross profits, so that altogether the year 1885 promises to be one of prosperity for our Western copper mines, so far as the production of copper is concerned. It is, however, very doubtful whether at present prices any profits can be made.

"Nymagee Copper Mine, about 120 miles from the Great Cobar, maintaining its reputation for producing excellent copper ores, while the purity of its copper bars excels those of the lower mines at Cobar. The disastrously low price of copper, the distance of the mines from the sea board, the high value of labour, the prevalence of drought, and the present hopeless aspect of the metal markets, have all combined to materially reduce the value of these shares. The ores of Nymagee average at least 5 per cent. higher than those of Cobar, and they are characterised by greater purity. The question of fuel supply, taken in connection with the smaller production of richer ores, is, of course, not of such pressing importance. Still we have no hesitation in saying that an adoption of the Cupola system or Pacific smelter would materially augment the production as well as lessen the expense of manipulating the ores. By such a process a rich regulus, or even white metal, might with Nymagee ores be produced in one operation. The march of improvement is slow in the centre of our great continent, very slow, where mines are under the control of stiff-necked Cornishmen, who refuse to march with the times. Under the pressure of low prices and enlightened advice the shareholders may possibly be stimulated to adopt processes that would put their remote mines on a better footing of equality with the infinitely larger and better situated mines of Europe and South America.

"Girilambone, with its blows and strings and capricious bunches of rich and easily reduced copper ores, is virtually at a standstill, and contributes nothing to the copper production of the Colony. Extensive prospecting works are in progress in the hope of intersecting in depth a respectable lode of sulphurets so much desired (why we fail to perceive) by the management. While wishing the popular Chairman and principal shareholder all success we trust that they do not build their hopes on indications that may prove delusive.

"Mount Hope, with its strong lodes and deposits of very fair carbonates, does not (on account of its isolation and the serious nature of the land carriage) add much to the copper production of the Colony as yet. The difficulty of land transit from these copper mines would daunt any but Australians. Here, again, the extension of feeders from the Great Western line, passing as one of these does this fine copper country, will at once solve one of the most trying problems that has hitherto impeded the progress of this district from the date on which copper was first discovered. The reputed value of the mine is great (and we think decidedly overestimated), but with railway communication we hope to see the production of copper bars augmented to a degree commensurate with its reputed resources and inversely as its capital, which fortunately is small.

"Little need be said upon the other and minor copper mines, some of which send for shipment or sale (as carriage or traction can be procured) respectable parcels of copper bars of excellent quality. During the copper mania that raged throughout these colonies in the halcyon times of South Australia and the Peak Downs numerous copper lodes and mines with large capitals were opened in various districts. In many instances there was not sufficient justification for the expenditure that eventually was lost. In other cases copper lodes that under careful and judicious management might have held their own during average years succumbed at the incipient stages of their existence, and their mouldering furnaces remain as monuments of the utter incompetence of those in charge." R. D. A.  
Sydney, Jan.

## NEW AND WEST CALLAO—INFORMATION SOUGHT.

SIR,—I shall be glad if any of your readers can give me any information about the above. Is it not time we should hear of results? It appears to me the time has long past by when we should know something about this. Can anyone explain how the shares of the West Callao are at such a discount. This company holds 750 acres containing several lodes, and possesses plenty of capital, yet the shares are unsaleable at 3s. 6d.? Any light upon the matter will be thankfully received by—  
NORTH DEVON.

## NEVADA MINING—No. IV.

SIR,—In pursuance of the tenor of my former letters on this subject it would be presumptuously gratuitous to affirm that the pecuniary success of mining could be assured under any and every event; but that in a majority of cases it might be, according to the nature of the objects and the motives which actuate their pursuit and development, speculation and certainty are respectively, as applied to mining enterprises, terms relative to conditions—natural, mechanical, or blindly or designedly speculative—according to their latitude and engrossment by intelligent observers, or debasement by unscrupulous manipulators, defects in whose schemes science and practice are too often attributed to discrepancies in natural conditions. More or less of certainty as of speculation are contingencies of mining, largely affected, if not wholly produced, by practical methods with whatever intent, and as such are inevitable at every stage of its progress and attainment. Where then, it may be asked, is the basis of its certainty? In its skill it would be proper to reply, exercised in the selection of the respective areas for purposes of systematic developments and the mode of developments they are subjected to—the prudence of its patrons and supporters, which discover itself in the calmness with which it surveys the situation, consulting natural conditions, unbiassed by preconceived notions, and acting according to the dictates of common sense, forming and maturing conclusions from incontestable facts which, however ignored, can never be suppressed, and from which there is no appeal, as there is no higher tribunal or superior authority. Improvidence is susceptible of a double definition—it may mean reckless expenditure or negligence of providing, in both of which respects it is characteristic of Nevada mining—of the past in a superlative degree, neither conserving its acquisitions, nor applying them or any portion of them to the development of the wealth on the threshold of which it was capriciously departing. The consequence is the solid and permanent sources of metalliferous and other mineralised wealth remain and are available on terms it would have been an insult to offer at those times. If the proper employment of money is its redemption, whether by successive increments of profits, or at a bound from sudden surprising developments of hidden but scarcely concealed wealth, there is no safer channel for such speculative investments than in Nevada mining properties, if carefully selected, prudently embarked in, and judiciously operated.

It has at length begun to be seen how short-sighted was the policy, practice, and pursuit of the past, and how much better it would have been had wiser counsels prevailed, and greater moderation been observed. The error of intoxicated avarice met a just and merited retribution. That stage has passed, introductory of a new era upon which the present borders; the signs of the times betoken a revival of mining throughout the State. When that time arrives, as it will in the near future, properties which now lie neglected will be eagerly sought for, and at premiums progressively advancing as developments determine the value and stability of their resources when subjected to systematic methods, not only as compared with the spasmodic and erratic proceedings of unsystematic methods, restricted to superficial areas directed by rudimentary experiences, but with any other industry. The past, though prolific of errors, has not been without its advantages to the present and the future. The ore-bearing zones have been traced and definitely localised distinctively in organised districts, roads opened thereto, and in numberless instances sufficient work has been done to satisfactorily demonstrate their character and enable judicious investigators to determine approximately their respective future values. The axiom "the whole is greater than a part" applies with unequivocal significance to mining enterprises. The resources of an old mine may be greater than those of many a new one, but there the comparison ends; it cannot be true of the former, as the resources of the long-wrought mine are less by what have been extracted therefrom, and intrinsically correspondingly depreciated in actual value. As the wealth of mines possess no recuperative powers they are, therefore, unconstituted for reproduction; that on which they depend is by process remotely external, more or less to gradually approximating results. The interests involved in each individual enterprise are affected by inherent conditions, specific and general, objectively pertaining in natural order to the things—mines—themselves, inclusive of pecuniary results, which again are affected in degree by the regime managerial, accord-



ing as its functions are efficiently or imperfectly discharged; which ever property or class of property possess the greatest known capacity for products and profits should be most esteemed. A lull in mining is the capitalists' opportunity, and those who avail themselves of it usually reap a rich reward. Such properties as I have herein referred to will, from overwhelming probabilities, doubtless return in profits hundreds per cent. on the outlay necessary to procure and launch them on a career of almost unexampled prosperity—unexampled certainly in comparison with the terms on which they may be secured, and the worth of wealth they are naturally capacitated to afford, and in a comparatively short space of time, as contrasted with that usually required in the prosecution of a severe course of systematic training of a like order.

*Iona, Nye County, Nevada, Feb. 9.*

ROBERT KNAPP.

#### OSCAR GOLD MINE.

SIR,—The sensible letter of "H." in your last issue will have been read with satisfaction by most Oscar shareholders. It seems to me that his theory of the decreased yield of gold for December and January is probably correct; and, if so, it should be a valuable guide for future operations. There is no doubt that, so far, the returns from the mine have been, to say the least, disappointing; but I do not think we need fear for the ultimate future. The careful experiments made by Capt. Plummer, Capt. Daw, Mr. Murchison, and others seem to show conclusively not only that our lodes are rich, but that there is gold (of course in small quantities) all over the place. I am not at all prepared to accept Mr. John Daw, jun.'s, later theory, that the substantial richness of the Oscar lode depends on the number of "bunches" we unearth; and so far as I am aware this theory was never propounded until after the December crushing. On the contrary, so far as an outsider can judge, it seems more probable that the foot of the lode, at any rate, is fairly rich throughout, and that if we fail to extract its richness the fault must be in our way of dealing with it. Now, I do not think that anyone can question the zeal and integrity of our manager, Mr. Daw, jun., and I think that the company owe a great deal to his energy and ability in getting the works so quickly into order. But it is notorious that the wisdom of his crushing operations has been very widely questioned indeed, and results have fully justified these doubts. It is quite clear, for instance, that the greater part of the stuff crushed in January ought never to have been put through the stamps at all at this stage of the company's existence. Later on experiments of this kind may be quite proper, but for the present they are obviously injudicious. Mr. Daw, jun., may (as he stated in one of his letters) derive satisfaction from the discovery that all the lode is auriferous—to the tune of 1 dw. to the ton—but the enthusiasm of the shareholders on the subject has certainly been repressed within decorous limits, and the enthusiasm of a brutal stock market has taken the form of driving the shares down from 1s. premium to 9s. discount. Now, it is all very well to say that the mine is not being worked for Stock Exchange purposes, which is right enough; but nevertheless, as a young company, we cannot afford to neglect the Stock Exchange estimate of an undertaking. This estimate is naturally based upon our returns, and moreover, apart from external opinion, our internal prosperity depends upon them also. Therefore, I beg to submit the following suggestions for their improvement in the future:—

1. There should be no more indiscriminate crushing for the present. On Mr. Daw, jun.'s own estimate 2½ dwts. per ton are required to pay expenses, and, therefore, it is a simple matter of arithmetic that to crush stuff giving 1 dw. only is a dead loss of (say) 6s. per ton. And a portion, if his surmise be correct, and much of the stuff crushed in January was ordinary rock, we must be careful for the future to confine our attention to the lode, and not apply any misdirected energy to crushing the adjoining country, as a shareholder grimly put it to me.—2. There should be no reckless developing work. Development will be all very well when we are fairly on our legs; but it is useless trying to run before we can walk, and too much dead work before our coffers are filled is simply a short cut to total collapse.—3. Capt. Daw, sen., told me in conversation a short time ago that he thought it possible that since a good deal of the gold was in a fine state of subdivision, a considerable part of it might be washed clean away by the use of too much water. This opinion, which I hear is confirmed by other mining experts, deserves careful attention.—4. Under these circumstances might it not be as well to buy a Moon amalgamator, by the use of which so many of our samples have yielded good results? Finally, I have heard it said, whether correctly or not I do not pretend to decide, that suggestions from head quarters are not always very well received at the mine. If this state of things really exists it is very much to be regretted, and in the interests of the company it ought not to continue, nor can I see any reason why it should arise at all. Criticism and enquiry do not imply mistrust, and still less accusation. But no mortal man is infallible, and without submitting frankly to a certain amount of criticism and enquiry, no mortal man in a responsible position can avoid sooner or later making mistakes. P.

#### NORWEGIAN MINES.

SIR,—As a mining engineer and a subscriber to your paper for several years, I have with great interest read your articles on the several mines worked in this country by English companies, and will venture (although my English may not be sufficiently correct for such correspondence) a few words on this subject. I note the mines chiefly treated are the Bratsberg, Norway Copper, Nedenes, and the Oscar Gold Mine. The former, originally called, and at the present time better known in this country as, "Onidals Verk," was first worked in the sixteenth century, and has since that date been periodically worked by ourselves, Germans and English, who, unfortunately for them, did not possess sufficient capital or such skilful engineers as the present company. Had such been the case, with copper at 100l. per ton, this grand old mine would have ranked the first in the world. The present company, under name Bratsberg Copper Company (Limited), has thoroughly developed a portion of the property, and although copper is only 48l. per ton, they have only to nip, nip, to in a short time repay the shareholders their outlay.

The Norway Copper Mines have been a failure. Has this property been sufficiently prospected? Nedenes Copper, near Arendal, generally known as "Boilestad Verk," has returned about 60,000l. in copper and is only about 90 fathoms deep on the hypothenuse, and although the lodes can be traced about 2 miles, comparatively speaking very little work has been done. It is, without doubt, one of the finest properties in this country. The average value of the picked or dressed ore will be about 7 per cent., and it is only about 10 miles from the sea. This property has been ruined by having too many masters; had Capt. Daw and his sons been allowed free hands the old company would still be living. Now the general report is that Capt. Daw, jun., M.I.C.E., &c., has resigned, surely the London management would think twice before allowing such a gentleman to leave them. Thousands of pounds have been thrown away in smelting experiments by English and German smelters, while the original owners were capable of smelting with a few uneducated workmen, and they themselves being shipowners. Who is responsible?

A word for the gold mines over which I am now roving. Here only one company of importance has been at work—the Oscar; but several merchants and a few fishermen have been doing a little prospecting. In the principal towns they are trying to form three large companies of about 30,000l. to 40,000l. each; but I doubt whether we have sufficient stock to enter into such enterprise. At the Oscar Mine the general arrangement is simply perfect, and I doubt not in a year or two but that Norwegian gold mining will equal anything yet discovered in Australia, California, or even India. In a year hence I shall visit these mines again, and doubt not but that the present contemplated 50 stamps will be increased to 100. The shareholders can congratulate themselves on being the possessors of a valuable property which is being opened under the guidance of a sound directorate and skilful management; but I must say I surprised me to see an English family living in such a rough and

barren island where a bush and a blade of grass would be examined twice, as their reality would be doubted.

*Rammelø, Feb. 24.*

Y. MARTINSSON.

#### MANCHESTER GEOLOGICAL SOCIETY.

The ordinary fortnightly meeting of the members of the above society was held, on Tuesday, at Manchester. The chair was occupied by Mr. CLEGG LIVESY. Dr. Black submitted for inspection one or two small blocks of grey chalk taken from the Channel tunnel at Dover, and the usual vote of thanks was passed.

#### EXPLOSIONS IN MINES.

Mr. J. S. BURROWS (Asherton Collieries, near Manchester), read the first portion of a paper on accidents in mines and their prevention, in which he dealt specially with the question of explosions in mines. After quoting extracts from the reports of H.M. Inspectors of Mines with reference to the number of men employed and the loss of life entailed in mining operations, Mr. Burrows said the first consideration in connection with the subject with which he had to deal was that of management. The responsibility imposed upon a certificated manager by the Mines Regulation Act (1872) was a great one for any man to undertake, and unless he was to be a mere figurehead to comply with the law, the manager should either have entire control of the underground workings, or if required to act under an agent, such agent should be a thoroughly qualified man, who had himself felt the responsibility of actual management, and, therefore, would not be likely to place his subordinate in a false position. It was also important that the underlookers and firemen should be thoroughly competent men, and alive to their responsibilities. From the very nature of explosions, sudden, unexpected, and far-reaching, carrying off all those who might, if spared, have testified to the state of affairs at the time of the accident, subsequent enquiries into their origin, however carefully conducted, had afforded little or no definite information that could be of value as a guide in the future. Of late years, however, careful experiments with so-called safety-lamps and coal dust had revealed unsuspected sources of danger, and furnished a probable explanation of many of our most disastrous and hitherto unaccountable explosions, and experiments recently carried out had shown conclusively that a mixture of only 5 per cent. of fire-damp with air, when ignited, was sufficient with the assistance of coal dust to cause the most violent explosion. Fire-damp was given off by all seams of coal, in many very freely, and the obvious course was to dilute or remove it as it issued by a current of fresh air. Powerful furnaces and fans had been erected, and immense volumes of air were passed through the mines, but still from time to time they were startled out of their fancied security by disastrous explosions, and it was of little use passing huge totals of air into the main returns and fan drift unless the air was properly distributed in the workings, whilst inferior lamps, such as the Davy, only afforded an increased source of danger in high velocities of ventilation. Given ample ventilating power, the next thing was to see that the intakes and returns were of sufficient area to pass the quantity of air required at a moderate velocity, and having done this, too much importance could not be given to the question of sub-dividing the air current in the various districts of the mine, so as to arrive at a good system, whereby the splits should be proportioned to the work they had to do, and every opportunity given for the gas to follow its natural course, and rise to the highest point. This arrangement of the splits was well worth all the care and thought that could be given to it, as a good system once established gave much better results and much less trouble than a mere haphazard method. The method of ventilating "strait" places by sheet-iron or canvas bags was thoroughly bad in principle, and was fortunately very seldom used, for although a brisk current might be produced at the end of 18-in. pipes, with an area of only 1.76 square ft., this current would be too sluggish for any use if spread over a place of 9 ft. by 4 ft., or 36 square feet in area. Pipes were sometimes employed with advantage to air a short rise tunnel, where brattice would probably be blown down or damaged by flying stones after shots, or to clear some cavity in the roof where ordinary brattice could not be fixed, but the usual method of airing "strait" places, was by means of brattice cloth, which, if carefully put up and tailed to wooden strips running near the roof, was very efficient up to a certain distance. When driving narrow work in a fiery mine ample space should be left behind the brattice to pass a brisk current of air, which, after sweeping the level and face, would return behind the cloth on the higher side. The one current should not be expected to air too many places, and the cloths in each large opening should be sealed to allow fresh air to mix with the return air from one place before it passed on to the next. The openings should not be too far from each other, and should be driven down-brow when practicable. It was needless to say that the cloth should be well put up, and kept within 6 or 8 ft. of the face. When the body of air or any level showed an appreciable cap on the lamp it was an indication that more air was wanted, or that it had done duty for sufficient places, and arrangements should be made at once either to increase the quantity, or else to pass the air over a crossing into the return, and start afresh with another split. If a "blower" were met with, which showed a cap of any size on the lamp, in spite of a good current of air, an opening might be driven at once down-brow, or if only a short distance past the last opening, the place should be stopped and allowed to drain. These were not imaginary cases, but occurred often in opening out new mines, and, therefore, the use of powder in such mines should be avoided. Air from pillar workings should never be used to ventilate narrow work. In working pillars the air should always be discharged at the highest level, so that the goaf might empty itself, gas naturally rising to the highest point. If no gas could be found at this place it was fair to assume that the goaf was pretty clear of gas. If, however, the air was worked downwards, although, with a good current of air, the edges of the goaf might not show any gas, it was almost certain, supposing gas to be given off, that the goaf behind would be full of gas, as it could not relieve itself. Less air, worked down-brow, would be more effective in keeping a district free from gas than a larger quantity worked the opposite way, and they would have more confidence that the goaf beyond reach of examination was clear. In this case also the cloths should be sealed as in narrow work, and the same split must not be expected to serve too many places. The danger attending the first heavy fall of roof, especially in a newly-opened mine, had forced itself very prominently upon his attention, and he believed that in some cases, where the explosion had been supposed to originate in an outburst, the gas had simply come from a fall of roof, which had been set down as a consequence of the explosion instead of the precursor and origin of the disaster. More or less gas was given off from the roof in every such case of first weight, and in one instance which had come under his notice sufficient gas was given off to fill the goaf as far as it could be examined, 60 yards of the topmost or return level, and to show a cap for some distance down the back jig brow for 12 hours in spite of a good air current. Fortunately this happened at 8 p.m. when nothing but the prop drawing was going on. He had himself heard gas issue with the noise of a small steam jet when a slight fall was taking place in a newly commenced wall, and he had been told of other similar instances. With the knowledge of these facts, and having often noticed that the return air from the topmost wall of a district in which pillars were being worked, after showing no indications of gas for weeks, suddenly began to show a greater or less cap on the lamp, at times revealing the presence of a large quantity of gas; he felt, after careful consideration of the subject, convinced that in many of our mines they might, and often did have, when commencing longwall or pillar workings, unsuspected accumulations of gas in the roof or floor sufficient to cause an explosion. For the sake of clearness he would only speak of the roof, but the same remarks applied equally to the floor. Let them suppose that immediately over the coal they had a tough metal roof (say) 6 yards thick, and above that again a hard rock. When the pillars had been removed the metal being tough parted from the rock above, and sank or bagged out in the middle to the extent of 1 or 2 ft., thus forming a reservoir in which gas could accumulate unseen possibly at a pressure proportionate to the quantity of gas existing in the

roof, and the strength of the metal below. Let them suppose that the metal had sunk 1 foot from the rock in the middle of the newly formed goaf, or (say) an average of 3 in. over the whole area, which they might assume to be 50 yards by 20 yards, they would then have over 2000 cubic feet of gas ready to be discharged as soon as a fall of roof took place. This 2000 ft. of gas at a pressure of more than one atmosphere would, when liberated, expand accordingly; but even at the atmospheric pressure, would be a very serious quantity of gas to deal with, however good the ventilation. It was, he thought, very possible that under such conditions accidents might have occurred, when such accumulations of gas were unknown and unsuspected, and that the reservoir having emptied itself before the explorers could restore the ventilation sufficiently to examine the workings no clue would be afforded as to what had occurred at the fatal moment, all those who could have told having perished. It was, therefore, advisable to keep the topmost level leading from the pillar workings for a return only, and under no circumstances to allow drawing or jiggling to be carried on where such return air travelled; for, should gas be given off, or forced out from the goaf by a sudden fall, it must travel with the air and meet the lamps of the workmen running against the current to escape into the fresh air. Bore-holes to allow of the escape of gas from the floor, had been put down in some instances with good results. In his opinion, longwall was not, as regarded immunity from explosion, superior to pillar and stall, provided that both systems were equally well carried out. Longwall had, however, this very great advantage that powder was seldom required, and with a long face having many breaks in the roof, with the successive weights, the gas in the roof could vent itself gradually, and the larger volume of air coursed round the longwall face was not so easily fouled. The first weight, however, required as much attention as in pillar and stall; in fact, more, because whatever gas was given off could not be passed into the return, as in pillar and stall, but was carried by the air current past most of the men. When working on the rise, the above-mentioned breaks were often very troublesome to keep clear, they were necessarily close to the men at work, and a slight fall near one of those breaks in the daytime at once converted a small quantity of gas in a narrow break into a goodly sized accumulation, perhaps unnoticed for some time. If they tried to force the air by means of cloths into such a break the ventilation of a good part of the workings might be seriously checked. The same result occurred in the case of a fall across one of the stall faces, and it was therefore well to scale the cloths in some of the gate-roads, both to freshen the air and to provide to some extent for emergencies of this sort. Experiments had proved the dangerous part played by coal dust in producing or aggravating explosions, but there seemed to be no means yet known of avoiding it. Watering the main roads was but a very imperfect remedy, and would in many minds spoil the roads by causing the floor to lift. The main roads could be kept fairly free from dust by paving with bricks or pieces of thin propwood, but some practicable scheme for laying the dust in the workings was still urgently needed. Neither gas nor dust could, however, produce an explosion without some flame to cause their ignition. In dealing with gas great strides had been made of late years, both in ventilating apparatus and in discipline, but the real source of danger—the possible means of firing the gas—present, had not received anything like the same attention. The flame necessary to ignite the gas might be provided by candles, by an inferior type of lamp, by a good lamp sent out in bad condition, or damaged in working, by wilful exposure of the lamp flame, or use of matches, or most likely by a blown-out shot. The use of candles seemed to be as anomalous in coal mines, and no apparent advantage could compensate for the risk attending open lights. The lamp in almost universal use until quite recently was the Davy, and unfortunately thousands of these lamps were still taken down our pits every day in spite of the knowledge that, although very useful in the hands of the firemen for the purposes of examination, they were absolutely unsafe in explosive currents of air and gas having a speed of 8 ft. per second, a velocity which at the present day was very common, with two other lamps before them, such as the Mueseler and the Marsant, which gave a much better light than the Davy, and which had satisfactorily withstood severe tests, there was no reason for clinging to a lamp which, however well it might have answered its purpose in bye-gone days, when there was no better lamp known, was totally unfit for use in modern well-ventilated collieries. The best lamps known, properly secured, and provided, cleaned, and maintained by the owners, were absolutely necessary for the safe working of our collieries. Good discipline and constant watchfulness on the part of all, both officials and workmen, should prevent any danger arising from defective lamps or unlawful exposure of the lamp flame. Undoubtedly, so long as gunpowder was used for blasting in coal mines, there would be a great risk of mishap through a blown-out shot. We jealously protected the small flame of the lamps, and yet hourly ran the risk of producing, with a blown-out shot in a dusty mine, a flame perhaps 40 or 50 yards long, besides a concussion sufficient to derange the ventilation of the district. When could they find conditions more favourable to an explosion than during the working hours? The face of the coal was giving off gas with every stroke of the pick, the air was loaded with dust, and fouled with powder smoke, &c., the ventilation was disturbed by the concussion of shot after shot, by the passing of tubs, and the continual opening and closing of doors and cloths, the air slackened when the furnace, if any, was being cleaned out, and the shot lighter always in a hurry to get to some place where he was wanted. Under these ordinary conditions a blown-out shot meeting the smallest quantity of gas might cost the lives of all the men in the pit, a risk too great, one would think, to be tolerated for a single moment. He was, therefore, afraid we must expect explosions as serious as any in past years, in spite of better lamps and discipline, until the firing of any shot whatever in the coal, or for blowing roof or floor in the main roads, was totally prohibited, unless all workmen were out of the mine, except the shot lighters and furnacemen, if any. There could be no question that this latter method afforded much less risk of an explosion, apart from the fact of very few lives being at stake, instead of a whole pit set. The fan or furnace men redoubled their watchfulness during the hours that shots were being fired, the ventilation was undisturbed, there was no dust, no hurry and bustle to prevent the shot lighter making the most thorough examination of the places and shot holes, and the shots were fired in their proper order, commencing at the return end, and working back to the fresh air. The actual value of the barometer as a warning of danger from gas in coal mines seemed an open question. A fall of 1-10th of an inch in the column of mercury was equal roughly to 53 yards of a vertical column of fire-damp, so that large quantities of gas would be given off from stagnant goaves before the fall of the barometer was appreciable, but artificial ventilation was capable of dealing with this gas as it was given off, and if the air from the highest point of such goaves passed no one, but was discharged at once into the return, no danger need be apprehended from this cause. A reduction of atmospheric pressure indicated by the barometer, might, however, hasten the falls of roof, and so liberate any gas contained in such cavities in the roof as he had previously described, but such falls would occur in due time whatever the state of the barometer. After quoting extracts with the view of showing the opinion held by other mining engineers that the barometer generally could not be regarded as a true indicator to mark the giving off of gas, but that it only recognised what might be termed clearly defined great fluctuations, and even then very slowly, Mr. Burrows, in conclusion, said the following were, in his opinion, the great points to be looked to for the prevention of explosions:—1. Good management and discipline.—2. Ample ventilating power, large airways, and judicious distribution of the air in the workings.—3. The best possible lamps, which should be provided, cleaned, and maintained by the owners, and furnished with proper means of locking.—4. As little powder as possible to be used, and no shots to be fired on any account when any workmen were down, besides the actual shot lighters.—5. Careful attention to "first weights" and dust.

During the past year the number of deaths from explosions had been only 51, as against 134 in 1883, and he earnestly hoped that in the future years, he was able to speak of the accident which occurred on Dec. 18, 1884, as the last explosion on record.



On the motion of Mr. WOOD, who said that the paper was a most important and instructive one to all who were interested in mining, seconded by Mr. J. S. MARTIN, Inspector of Mines, a vote of thanks was unanimously passed to Mr. Burrows for the paper he had read.

Mr. PEACE said some very good suggestions had been thrown out in the paper, and he quite agreed with many of them, and hoped they would be adopted.

Dr. BLACK asked whether some means for watering dry mines, such as were used for watering the streets, could not be adopted?

The CHAIRMAN said some very important points had been brought forward in the paper which would require some thought, and they would probably be better able to discuss these after the printed copies of the paper had been placed in the hands of the members. The watering of the roads in dry mines had been attempted in various ways, but it was a matter which was surrounded with difficulties. With regard to the firing of shots he was afraid they could not accept the rules which had been laid down as applicable to all places. There were many pits in this district in which the quantity of gas given out was extremely small, and to shut out the men when shots were being fired, would, in such cases, be a waste of the men's time, and an unnecessary expense.

Mr. BURNETT asked whether explosions were more frequent in dry mines or in wet ones?

Mr. BARRETT said that as a colliery owner he felt very much indebted to Mr. Burrows for the paper he had brought before them. There were several questions which he had introduced that were new to him, and which he should carefully consider.

Mr. TONGE cordially endorsed most of the points raised in the paper, but there was a question of the relative advantages and disadvantages of the longwall system, as compared with pillar and stall with regard to ventilation, upon which he differed with Mr. Burrows. He thought that taken all round the longwall system possessed the greatest advantage.

Mr. J. S. MARTIN, Inspector of Mines, was pleased to hear that Mr. Burrows exonerated the collier from the frequent charge of being the cause of the accidents in mines. With regard to the question of atmospheric changes affecting explosions this was a point on which something might be said. He did not think, however, that it was right that the credit of the lessened number of explosions during recent years should be assumed to be due to the warnings occasionally published in the newspapers with respect to barometrical changes, and so little credit given to improved management, and better appliances in collieries. In most cases any change that might be caused in the mine had taken place before the warning could reach the colliery manager through the newspaper, and the barometrical variations in the surface had very little effect, as compared with the immense pressure of the gas in the workings. The giving out of gas was much more affected by the "weighting" of the roof, and in such cases they had experience of gas being given off in very large quantities. The used of naked lights was in many parts still adhered to with great tenacity, notwithstanding the great improvement which had been effected in the light given by safety-lamps, and he had himself known the practice result in several serious accidents. With regard to the proper laying out of mines for ventilation he could fully bear out what Mr. Burrows had said, and with regard to coal dust in mines it had been shown by experiments that with a very small quantity of gas the dust was a very dangerous matter.

The CHAIRMAN observed that, from reports he had seen in the newspapers, a mistaken impression appeared to prevail that the great heat during the summer time had an effect upon the workings of a mine. For many years he had had the heat taken at the bottom of the pit and at the top, and between the hottest day in summer and the coldest day in winter the temperature in the mine did not vary 1½°.

Mr. WARBURTON asked whether Mr. Burrows had, in longwall proper found many falls of roof. His experience in longwall proper was that the roof gradually sank when they advanced the face sufficiently fast, and he did not find any falls and very few cavities.

Mr. BURROWS, in reply to one or two questions, pointed out that very great difficulties would be encountered in attempting to water efficiently a dry mine; and with regard to explosions in dry or wet mines, he could only, speaking from memory, say that all the explosions with which he was acquainted, occurred in dry mines.

The discussion was then adjourned.

#### CORNWALL MINERALS RAILWAY.

The half-yearly meeting was held on Saturday last at the Westminster Palace Hotel, Mr. ROBERT JACKSON, Chairman, presiding. The CHAIRMAN, in moving the adoption of the report, which has already appeared in our columns, said that hitherto for a long time the Board had had to meet the shareholders with expressions of hope deferred, but now the scheme of arrangement, after having been fully investigated, had been sanctioned by Mr. Justice Kay, and there appeared to be no doubt that it would be confirmed though the time for appeal against it had not yet terminated. Only two of the shareholders, however, had raised any objections to the scheme in court. In 1879 when a former scheme was proposed, which led to much litigation as to the question of priorities among the stockholders, the amount of interest due on debentures and debenture stocks was £1,700, and on other accounts £2,578; but at December last the interest due on debentures and debenture stocks was £6,000, and on other accounts £9,100, while the cash assets of 1879 were £13,200, and in 1884 £21,400. Only. This deterioration had arisen while the litigation had been going on. The scheme which had been sanctioned would clear off all these liabilities except the sums which had accrued due to the Great Western Company for advances beyond the actual percentage of the traffic receipts to which that company was entitled. The scheme would relieve the Board from all financial embarrassment. In regard to the traffic of the railway, the passenger traffic had shown an increase in all the three classes, but the traffic in china-clay for export and coal for imports had both fallen off owing to the depression in the china-clay trade, which had not existed in Cornwall, but in the Potteries. At the request of the Great Western Railway the board had authorised the expenditure of £200,000 for additional siding and other accommodation at Bugle and Drinnick Mill stations, which had been found necessary for the development of the traffic. This outlay would cost the company 5 per cent. per annum until the traffic produced a sum beyond the minimum of the guaranteed rent. Under the new scheme there would be no accumulation of arrears, and that would be satisfactory.

Mr. CHAMBERLAIN, (the deputy-Chairman) seconded the adoption of the report.

Mr. W. ABBOTT said the improved condition of the company was due to the exertions of the present directors. In regard to the future they could not expect the present depression in trade to last for ever. The fact that the passenger traffic had increased showed that the district served by the railway was being more appreciated by pleasure-seekers and those who delighted to frequent beautiful scenery such as existed at or near Newquay. Now that the company would be out of the hands of a receiver the Great Western Railway might be more inclined to do all it could to develop the traffic of the railway. Though the new scheme increased the nominal amount of capital, yet there were advantages on the other hand in stopping litigation and the accumulation of interest, so that the stock of the company would become more and more marketable, and consequently more valuable. Who could tell what the shares of this company would in time be worth, when the Great Western Railway shares, now at 133, were some years ago sold at 38?

The report was adopted.

Mr. T. S. Soden and Mr. Hurst were re-elected directors, and Mr. S. L. Price was re-elected auditor to the company.

WELSH MINERS AND THE GOVERNMENT.—The following resolution has been adopted by a representative meeting of Welsh miners at Ton:—"This meeting, representing 16,000 miners of the Rhondda Steam Coal District, whilst depreciating expenditure of money on unnecessary wars, desires to express its sympathy with Her Majesty's government in the present crisis, and to state its unabated confidence in Mr. Gladstone's Administration, and to give expression to its convictions that no better can be found at present."

#### TERRIBLE COLLIERY EXPLOSION.

The North of England has again been startled by one of those terrible colliery explosions which seem to recur at regular intervals, casting gloom and lamentation behind them. The present disaster, so far as is at present known, involves the loss of 38 or 40 lives. It occurred on Monday evening about nine o'clock at Usworth Colliery, situate about 8 miles from Newcastle, on the main line of the North-Eastern Railway system, and about 8 miles north-west of Sunderland. The colliery is an important one, and gives employment to about 400 men and boys. It is the property of Messrs. John Bowes and partners, the managing viewer being Mr. Alfred Palmer, brother to Mr. C. M. Palmer, M.P. for North Durham, who is also a partner in the concern. Although the pit is looked upon as one in which the fiery element exists, yet it has through careful management and an excellent system of ventilation, supplied by an immense Guibal fan, having 45 blades, been kept remarkably free from accidents resulting from gas explosions hitherto. The last catastrophe of a similar nature occurred as far back as 1855. The pit was worked by day and night shifts, three seams of coal being worked—the Maudlin, the Low Main, and the Hutton. The deepest of the three seams is 172 fathoms. There are two shafts at the colliery—the main shaft and the back shaft. The whole of the coals are drawn from the main shaft which is bratticed to the bottom, one side being known as the west pit and the other as the east pit. The back shaft is used for down-cast purposes only. It has been ascertained that the explosion occurred in the west pit, where at the time most fortunately only a comparatively small number of men were working.

About 4 o'clock on Monday afternoon a number of off-hand men, such as shifters, stonemen, fillers, and others descended the mine, one party of them going to the east pit, and the remainder to the west pit. These men continued at their labours uninterruptedly up to about 9 o'clock. This is the hour when the night shift usually descend to their work, and at that time accordingly on Monday night a large body of workmen were standing about the pit's mouth in readiness for their several duties. A cage, indeed, with a full complement of men was actually making ready to descend the shaft when a rumbling report rolled up the shaft, followed by clouds of dust, a rush of air, and some portions of wreckage. It at once became manifest to all those who were standing about that something of a fearful nature had occurred in the pit. The bratticing between the two pits was smashed completely up, and the cage, which was ready to descend, was blocked in its position. No commencement had been made to lower the cage, and this was a fortunate matter, as, had it once got fairly into the shaft, not one of its occupants could have escaped instant death. An alarm was at once raised, and Mr. Morland, manager of the colliery, and Mr. Lindsay, assistant viewer, were immediately in attendance, Mr. Alfred Palmer being also communicated with. On a hurried examination it was found that the main shaft was blocked up so entirely as to shut off any hopes of entering the mine by this means. The back shaft, however, was still in a state sufficiently complete to admit of a descent being made into the workings. For this a hardy band of brave men soon offered themselves. A kibble and chains having been hastily fitted up, the explorers, accompanied by Messrs. Morland and Lindsay, descended. On reaching the bottom it was seen that the explosion had come from the west pit. The course of the latter was followed, and soon the explorers came upon indications of the fury of the destructive force which had swept through the workings. Not far from the shaft bottom were found five of the workers, one of whom was dead. His name was Ridley Taylor, married. Another of the four was the foreman of the South Maudlin engine, named William Howarth. This man was scalded, burnt, and bruised very severely. The third man thus rescued was James Quin, mason, the fourth was Thomas Dobson, and the last was a man named Prest. Singular to relate, all this time the men employed in the east pit were unaware of the fearful catastrophe that had occurred in the west pit. A loud and quick report had been heard by some of them, but as the air current had continued free and undisturbed they concluded the noise was occasioned by a fall of coal. On information being conveyed to them by the exploring party of the dangerous position of the mine, the whole of the men at once left their work, and means were taken to send them to bank.

Further explorations in the west pit now revealed to the exploring party that the gas had exploded in some distant part of the workings. Their progress was checked by heavy falls of coal and stone from the roofs and sides of the roads they were endeavouring to travel. At times it was necessary to get on their hands and knees before some of these heavy falls could be got over. Every effort was made to get far away into the workings, but the difficulties which presented themselves were so hard to overcome that it was at last deemed advisable to return again. Accordingly at 3 o'clock on Tuesday morning they were drawn to the bank. The falls in the pit were reported to be of a very huge and heavy character, although the air current was sufficiently good to offer no inconvenience to the explorers. Mr. Alfred Palmer superintended the relief arrangements at the top of the pit with most commendable energy. Mr. Hylton, of Washington; Mr. George Hornby, of Usworth; Mr. Hutt, Usworth; Mr. Charles Morland, jun., and several other gentlemen were also present giving assistance. Drs. Wilson, Jackson, Jacques, and Kane were also on the spot, and the injured men above named were promptly attended to by these gentlemen. The vicar of the parish, the Rev. Mr. Simpson, was also very early at the pit, and endeavoured to assuage the mental anguish of those of the poor people who needed his ministrations. Soon a large crowd had gathered at the pit, from the village, and as the day dawned more were to be seen hurrying to the scene. By noon, on Tuesday, some thousands of miners and others were assembled around the pit, having come from collieries in the neighbourhood.

As the men in the east pit were leaving their working places after being apprised of what had happened, they found, on reaching the bottom of the shaft, that everything about was lying in the utmost confusion and disorder. Fortunately they were soon communicated with by the rescuers, who were first to descend the mine. Means were found to get them away from their perilous position, but as only one or two could be sent up at a time, it was necessarily slow and tedious work. It was 5 o'clock in the morning before they were got out. One of them, Richard Ivey, a mason, gave the following narrative of the disaster:—"I was employed in the east pit about 2 miles in by. We were putting in props, and while doing that, about 20 minutes past 9 o'clock, I heard a heavy dead thud as of a fall at some considerable distance. The sound seemed to be above our heads, we being in the low main seam. I thought nothing of it, but one man said he thought the pit had fired. I went on with my work for about five minutes, when I was obliged to go out to get my lamp relighted. After I had got a short distance out I met some men, who said there had been an explosion, and they were making for the shaft. I smelt a small like burning tow, and I began to fear that the worst had happened. I ran back and shouted to my mate to come out as quickly as he could. My mate joined me, and we followed some men out. Two or three times we experienced a peculiar atmosphere, which seemed to induce sleep. The men ahead were going very slowly and cautiously, and I at length took the lead. At the shaft I found a number of men gathered together, and very soon the whole of the men in the east pit reached the shaft. I afterwards heard that there was a way through to the bottom of the back shaft, and I made my way there. I had to wait till half-past 2 o'clock in the morning before I was taken out, and before we were rescued we had to creep through the debris, which nearly choked our way. All the men suffered greatly from cold while at the bottom of the shaft, but otherwise received no injuries. I fear there is very little chance for the men in the west pit, where the explosion took place.

Other rescuing parties succeeded the one which first descended the mine. Their task was found to be one of great difficulty, and the progress made was only very slow. Any number of men were ready as volunteers to make up the rescuing parties. This is one admirable feature in the character of the miner. There is never any lack of men with stout and willing hearts who are ready to brave all the dangers attendant upon explosions in the mine. Death seems

to have no terror for them; their only thought is for the rescue of their fellow-workmen who may be entombed in the darkness of the pit. Unfortunately two of the explorers, named Richard Shee, master-shifter, and Elijah Donnelly, while lending their assistance in their work of recovery, were so overcome with choke damp that they succumbed. Mr. Lindsay, one of the managers, has also been affected by the deadly gas, but by medical attention in the workings he has recovered. Mr. Harry Robinson and Mr. Chicken gave valuable assistance to the explorers, as did also a shifter named William Hardy. Mr. Robinson was, however, compelled to withdraw from his labours, having seriously injured one of his feet.

Up to a late hour on Wednesday afternoon no more bodies had been recovered. Explorations were still being urged forward, and everybody concerned was working with great energy. Large quantities of brattice cloth, flannel, ropes, and other material have been sent into the pit, and fresh relays of explorers are at intervals relieving those who have preceded them in the work.

All the men and boys employed at the Usworth Colliery have been members of the Northumberland and Durham Miners' Permanent Relief Fund for many years, and the owners of the colliery, Messrs. J. Bowes and Partners, have yearly contributed a percentage upon their workmen's subscriptions.

The published lists estimate the loss of life as follows:—Married members of the fund, 27; unmarried, full members, 8; half members, 3; total, 38. The married members leave 27 widows and 38 children, who are of ages entitling them to weekly grants from the fund. The amount which will be paid from the fund under the head of legacies will be as follows:—27 widows at 5l. each, 135l.; 8 unmarried full members at 23l. each, 184l.; and 3 half members at 12l. each, 36l., making a total of 355l. A weekly grant of 5s. will be made to each widow, and of 2s. for each girl under 14 years and boy under 12 years of age. The total amount of liability entailed upon the fund by the explosion is estimated at 6000l.

On Thursday evening a correspondent writes:—Considerable progress has now been made in clearing the main shaft and opening out the main road into the workings in the Maudlin seam. Only the bodies of two boys have been recovered to-day, in addition to those got yesterday. The progress of the explorers is still much retarded by heavy falls of roof, and near the entrance to the workings where most of the men are expected to be found there is a large quantity of "after-damp," which causes much anxiety and trouble. About 1 o'clock to-day several of the explorers were brought out, having been seriously affected by the foul air; they were, however, all restored. The clearing of the workings and the recovery of the bodies will still occupy a considerable amount of time. A large number of horses and ponies have been killed, but one small pony was found to-day alive.

#### MINES DRAINAGE COMMISSION.

A monthly meeting of the South Staffordshire Mines Drainage Commissioners was held in Wolverhampton, on Wednesday. Mr. B. HINGLEY presided, in the absence of Mr. Walter Williams through illness.—Mr. Raybould asked whether the report respecting the pumping of the Bromley Pound had yet been received? The Secretary (Mr. H. Smith) replied that two of the members of the committee which had been formed to enquire into the matter and report had been unwell. They had, however, been investigating the case, but they had not yet sent in their report. The Chairman suggested that the secretary should write to the members of the committee and ask them to send in their report by the next meeting. The suggestion was adopted. Mr. Raybould remarked that they were all aware of the great expense which had to be incurred in pumping pounds. As he was advancing in years it was only natural that he should be anxious to see the matter settled. Mr. J. W. Williams said he hoped that Mr. Raybould's patience and honesty of purpose might be met. The subject then dropped.—The Surface Works Engineer (Mr. E. B. Marten) reported that during the past month work had been chiefly concentrated on the puddling or raising of the water at Portobello, Bagnall's Pool, and the Straits. The systematic clearing of the other courses was proceeding. Some few cases of overflow of the streams from the heavier rains of the past month had increased the water in some of the pits, but the fewness of such instances rather showed that the great bulk of the surface work done in the past had been effectual in its purpose. In reply to the Chairman, Mr. Marten stated that the surface works extended over 500 miles.—The Mining Engineer (Mr. E. Terry) reported that since the last meeting the water had sunk 2 ft. 8 in. at Stowheath, and 8 in. at Osier Bed, but that it had risen 6 in. at Portobello, 1 ft. 9 in. at Rough Hay, 9 in. at Cole Hall, and 1 ft. at Moxley. Seventy-five yards of levels had been driven towards Horseley, and 160 yards of arching had been put in at Gospel Oak, Rye Pit, and No. 8 Gospel Oak. The bottom lifts of Moat new engine were in, and the stays and main pump rods were now being got in position. The water at the Horseley Bye Pit had been bored off down to the heathen coal, and the sinkers were now at work in the bottom of the shaft.—The Chairman considered that the reports were very satisfactory.—Mr. E. Howl, said the Triumvirate were hoping that the erection of the Moat engine would be concluded by the time of the next meeting, so that the Commissioners could inspect it.—There was no other business.

THE PROPOSED REDUCTION OF MINERS' WAGES IN YORKSHIRE.—On Monday a meeting of the Council of the Yorkshire Miners' Association was held at the Miners' offices, Barnsley. The attendance was large, over 100 delegates being in attendance. Mr. Edward Cowey (President of the Association) presided, and the officials—Messrs. B. Pickard, J. Frith, and W. Parrott—were present. The wages question was discussed, and the following resolutions were passed unanimously:—1. That this Council is of opinion that the demand made by the colliery owners of Yorkshire for a reduction of 10 per cent. be resisted by all legal means, and that each colliery is earnestly desired not to make any arrangements in the matter, except by and with the full consent of the Yorkshire Miners' Association and the county generally.—2. That a conference of the whole of the county be called for Monday, March 9, at Rotherham, to discuss the wages question, and that each colliery and pit-steam be requested to call meetings, and appoint delegates to attend the same.

RATING OF MACHINERY.—At the annual Conference of the Associated Chambers of Commerce, Mr. Thompson (Sunderland) moved, and Mr. Oates (Heckmondwyke) seconded, a resolution affirming the desirableness of putting an end by legislation to the uncertainty which exists as to the liability of machinery to be rated for the relief of the poor, and abolishing this liability if it existed.—Mr. Sampson Lloyd, M.P., said they were likely to raise the question whether not only machinery but every description of personal property ought not in equity to be rated. He thought it monstrous that land and houses should bear the burden of all manner of rates, while 100,000l. in Consols was wholly exempt.—After some further discussion, the resolution was carried with the amendment—"Machinery other than motive power."

SUBSTANTIAL SALVAGE REWARD.—An important salvage claim by a Newcastle steamer has just been decided by the Admiralty Court. The claim for salvage reward was brought by the owner of the screw-steamer Clevedon, of Newcastle, against the owners of the screw-steamer Carranza, of Bilbao, which had sprung a leak at sea. The crew and steamer had been saved under trying circumstances. The Court awarded 5000l., apportioned as follows:—Second officer, 600l.; others of the crew 1600l.; divided amongst the owners of the Clevedon 1800l.; Captain Blance, 300l., and the remaining 1700l., divided amongst all the crew.

FATAL ACCIDENT IN A COLLIERY.—On Wednesday afternoon a middle-aged man named Solomon Firth, stone miner, of Sugar-square, Dudley Hill, was accidentally killed at Kelly-Land Pit, Hunsworth, belonging to the Bowling Ironworks Company, by a huge mass of stone becoming detached from the sides of coal, and completely burying him beneath its weight.



## MINERS' CONFERENCE IN BIRMINGHAM.

A conference of miners, called under the auspices of the Miners' National Union, commenced its sittings at Colmore Chambers, Birmingham, on Tuesday. Mr. T. BURT, M.P., occupied the chair. The business was merely formal, and the officers elected were—Mr. W. Crawford (Durham), secretary; Mr. J. Nixon (Northumberland), treasurer; Mr. B. Pickard (Yorkshire), vice-President. Tellers: Mr. E. Cowey (Yorkshire) and Mr. S. Woods (Lancashire). Credential Committee: Mr. P. Carlin (Durham) and Mr. D. Edwards (South Wales). Business Committee: J. Wilson (Durham), J. Frith (Yorkshire), and J. Ashton (Lancashire). The question of admitting the reporters was discussed, when it was decided to admit them only to the delivery of the President's address this morning. Before the close of the sitting the President read a telegram which had been sent to Mr. Crawford (Durham miners' secretary), announcing a fearful explosion at Usworth Colliery, in Durham. The following motion was unanimously passed:—"That this Conference, having heard the report of an explosion at Usworth Colliery, in the county of Durham, expresses its deep sorrow at the bereavement which has so suddenly fallen upon the locality, and its entire sympathy with the relatives of those lost by the fearful catastrophe, and hopes that these calamities will ere long be less frequent in their recurrence, and less direful in their effects." Following this motion, the President was instructed to send a telegram to the miners' secretary at the colliery, which was done as follows:—"Will you convey to the relatives of those lost by the explosion the sympathy of the delegates assembled at the Conference now meeting in Birmingham, and our hopes that the loss may not be so great as is reported."

The Conference then adjourned until Wednesday, when

The CHAIRMAN, in delivering his Presidential address, said that the programme before them was divided into two parts, one dealing with amendments to the Mines Regulation Act, and the other with the political situation. In addition to other reasons why working men should be combined, the miners had a very special reason in the fact that they followed an occupation that was beset with extraordinary dangers. The record of deaths in mines for the last 50 years, during which period there had been inspection and a careful record had been kept of the disasters, was a very terrible one. In coal mines alone since 1851 over 36,000 lives had been lost, and during the last 10 years upwards of 12,000 lives had been lost, giving an average of more than 1200 a year. The mineral statistics for the year 1884 were not yet published, but he believed they were prepared, and he had no doubt when they were published two or three changes would be observed. He thought it would be found that there was a slight increase in the number of persons employed in mines, but that there was a diminution in the quantity of minerals raised, both as regarded coal and ironstone, and that the coal raised was about 3,000,000 of tons less than in 1883. He also believed it would be found that in respect to the loss of life the year 1884 was unusually favourable—in fact, more favourable, if they considered the number of persons employed, than any previous year. In reference to explosions, which although not the largest source of danger, was a very startling source, and one that appealed strongly to the public mind, he remarked that the statistics would be found to be even more satisfactory. In 1884 there were 65 lives lost by explosions, and those who were familiar with the facts and figures relating to the loss of life in mines would be aware that that was a lower figure than had been the case in previous years. The next lowest was in the year 1864, when the number was 94. He had no doubt that the comparatively favourable record was due partly to the fact that greater care had been exercised. Very probably there had never been a period when so much attention was paid to accidents in mines as during the last few years. The Royal Commission on Accidents in Mines, which was dragging its slow length along, and the members of which were now engaged in preparing their report, had undertaken and carried out a series of experiments, on a larger scale, and more carefully, probably, than had ever been the case before. Those experiments were not yet completed, but he thought they would be before long. Although the Commission had not been able to report, they had from time to time called the attention of the Home Office, and the Home Secretary had called the attention of the Inspectors to certain defects which had been brought to light during their examinations, particularly in respect to safety-lamps. (Hear, hear.) The old Davy lamp, which had a great reputation some years ago, had been proved to be utterly unsafe, especially where there were strong currents of air, and the Royal Commission called the attention of the Home Secretary to that fact, and he issued a manifesto to the colliery-owners through the Inspectors. A very good friend of the miners, Mr. E. Lever, very generously offered a prize of 500*l.* for a better safety-lamp. A great number of experiments were made, but no lamp forthcoming was, in the opinion of the adjudicators, entitled to the prize, and consequently it was not awarded. Mr. Lever, whose chief anxiety was the protection of the lives of the miners, had expressed his willingness to renew his offer, if it were deemed advisable, or he would give a prize of 500*l.* for a substitute for blasting. The communication was made to him (Mr. Burt) privately, and he replied that he did not suppose any great good would accrue from a competition of the kind, because experiments were being made by inventors, and he had no doubt the invention of a substitute for blasting would be made before long. Although there was much room for congratulation, still it was quite evident a great deal remained to be done. They had had a very significant and emphatic warning since they had assembled in Birmingham, and so they must not rest upon their oars, but do whatever was possible in order to render the occurrence of such terrible explosions less frequent than they were, if they could not put an end to them altogether. There was a great number of people, including very eminent and able men, and also large and influential societies, who objected *in toto* to all legislation of that kind. For instance, the Liberty and Property Defence League was one of those societies they had to fight against in their efforts to improve the condition of the miners and working classes generally. If there was a single chapter in our Parliamentary history that had been thoroughly vindicated and justified by facts it was that of factory legislation, and still more particularly of legislation for the protection of the lives of miners. They would, therefore, take their own course, undeterred either by criticism or opposition. Referring to the legislation he brought before the House of Commons in July last, in favour of an increase in the number of Inspectors, he reminded the conference that the Home Secretary accepted his proposal, promising not only to increase the number of Inspectors, but also to do all he could to secure for the purpose men from the ranks of the working miners. He saw Sir William Harcourt just before leaving the House of Commons on Saturday morning, and reminded him of his promise, asking him when he was going to appoint these additional Inspectors. He said that he had found rather unexpected difficulties. He had been endeavouring to select men, and, indeed, had made offers to certain men in the way of carrying out the proposal; but he had found it was by no means so easy to obtain men as he had expected. He added, however, if the Government survived the motion of censure he would lose no time in going thoroughly into the matter. He (Mr. Burt) ought to mention that the Inspectors, whoever they might be, would have to undergo an examination; and they certainly were not the parties to object to that, since they had always insisted that managers, and everybody in an official position ought to undergo an examination before being appointed. All they objected to, if he gathered aright their views, was class favoritism. They wanted a fair field and no favour. Where competent men were obtainable from the ranks of the working classes—and they believed that such men were obtainable in sufficient numbers—the fact that they had been working men should be no disqualification, but rather a strong recommendation. He need not remind them that a very great measure of reform had already received the Royal sanction, and that the complimentary measure for a redistribution of seats would also be passed during the present session. This amounted to a revolution in the position of the masses, for the working population, from having been somewhat powerful since the measure of 1867, had now become paramount. One great question

they had to discuss would be the number of labour representatives to be sent to the House of Commons, and on that point he had no doubt they were all agreed. They would, he thought, accept the principle he had already endeavoured to enunciate. They did not go in for class representation or for class measures in the House of Commons, but they objected to class exclusion, and they said that the working men, being the great majority of the people of the country, were fully entitled to have men from their own ranks in the House. He would not try to forecast the future, but he hoped and thought that a considerable number of labour representatives would be sent to the next Parliament. He was very hopeful, so far as the miners were concerned, that they would do their part. Already they were taking steps in many parts of the country. In Northumberland he believed another representative would be sent. Their friends in Durham he had no doubt would send Mr. William Crawford, Mr. John Wilson, and Mr. L. Trotter. From what could be heard it was pretty sure that Mr. B. Pickard would represent a division in Yorkshire, and he thought he might say also, on authority, that Mr. Abrahams would represent the Rhondda Valley. Efforts would be made to put other representatives forward. Mr. Edwards, he believed, would be brought forward for North Staffordshire, and he hoped that all these, and other men, would be returned to the House of Commons. Why had labour representatives not been sent to Parliament in larger numbers? He noticed the other day in reading the Parliamentary debates that their friends the proportional representationists alleged that it was because of the existing electoral machinery, and they considered that if they could have minority representation the chances of labour representation would be very greatly improved. For his own part he did not believe there was a particle of foundation for such an opinion. He was decidedly of opinion that the Bill of the Government, which divided towns and localities into districts, whatever other defects it might have, gave the working man much more power in the way of sending special representatives than the scheme of minority representation advocated by Mr. Leonard Courtney and others. The limited election of direct representatives of labour in the past was not because the working man had not had the political power. It was partly because of the enormous and scandalous cost of elections, and because there was no machinery for supporting Members of the House of Commons when they were elected. In preparing the way for labour representatives to be sent to the House of Commons, there were two points which ought to be insisted upon. One was that the returning officers' charges should be thrown upon the rates, and the other was the payment of members. He did not see why it should be considered such an improper and degrading thing for a Member of the House of Commons to be paid. Members of the Government were paid, the Queen and the Royal Family were paid, and if they looked at other countries there was not a country in the world where representatives were not paid except Great Britain. It was said that the payment of members would increase the number of professional politicians. He did not want the number of professional politicians increased. He wanted men to go into politics with an earnest desire to benefit their fellow men, and not merely to make politics a trade; but he thought it was a matter entirely in the hands of the constituencies themselves, who would not be at all more likely to return professional politicians than the people who hurried his taunt at them. The question of the payment of members was likely to come practically before the House of Commons during the present session of Parliament. Mr. Sheridan, an old and good friend of the miners, was introducing a Bill with reference to the subject, to the back of which he asked him (Mr. Burt) to put his name. He declined to do so because Mr. Sheridan intimated that it was for the payment of members under certain conditions, and one of the conditions was that a working-class member should appeal and ask to be paid before payment was obtained. He objected entirely to any such distinction, and on that ground he declined to give his name to the back of the Bill. He had, however, since learnt from Mr. Sheridan that he had struck out that distinction. He had no right to speak of anyone but himself, but his own opinion was that when they had payment of members they should make every member alike. If there was to be any special distinction between one member and another he should certainly adhere to the principle already established in his own case in the North. If there was no general payment of members, direct representatives ought to be paid by the bodies of Trades' Unionists who brought them forward. He should be very unwilling to accept payment by the State, except it came in the shape of payment to all members, irrespective of their social position, wealth, and other considerations. He looked forward hopefully to the future. He did not take the desponding view some of their friends did. He remembered Mr. Goschen, in a very able speech delivered a short time ago in Edinburgh—and Mr. Goschen was not remarkable for his confidence in the masses of the people—the working classes especially—said he was very hopeful that when the working classes were fully endowed with political power they would make no unselfish or narrow use of it. He (Mr. Burt) entirely endorsed that sentiment. He believed they would make a less selfish use of it than the privileged classes of the past, not because they were better than others, or that their consciences were more sensitive, but because, being the great majority of the nation, they had no interest in the perpetration of injustice. The working classes had been late in coming into their heritage, but their heritage was a great and glorious one. Their material resources were not exhausted. The old country, old as it was, was not worn out; the sun still shone overhead, the kindly, generous earth, was still responsive to the hand of honest and well-directed labour; but his faith was in the moral qualities of the British race, in some of those qualities that were not seen, or seen only in their effects—his confidence was in the energy, the skill, the industry of their energetic population; and it was to those qualities, reinforced, as he believed they would be, by habits of temperance and justice, rather than to their soil, their climate, or even their mineral treasures or military prestige, that he looked for the maintenance of their proud position among the nations of the world.

On the motion of Mr. W. PICKARD (South-West Lancashire), seconded by Mr. E. COWEY (Yorkshire), a hearty vote of thanks was accorded to the President for his address.

The business of the Conference was then proceeded with.

Mr. A. SHARP (Cumberland) moved—"That in any alteration of the Mines Regulation Act, 1872, the workmen should have the right to select any person to weigh the mineral gotten by them, and that, so far as such person selected is concerned, the management shall not have any control over his actions other than his wilful breach of the Act under which he is appointed; and that, apart from his work, he be free to act as other ordinary citizens in other business connected with mining, or in general matters open to ordinary citizens, and that the words 'otherwise misconducting himself' be omitted in any new Act."

Mr. J. HOPKINS (Nottingham) seconded the resolution, and complained of the refusal by one of the firms in his district to allow a man who was employed at bank to be a check-weigher because he came within the scope of the 18th section of the Act. The section in question is as follows:—"The check-weigher shall be one of the persons employed either in the mine at which he is stationed, or in another mine belonging to the owner of that name." He added that the magistrates in the Nottingham district held that the contention of the workmen was well founded, and that the case was still proceeding.

Mr. E. COWEY (Yorkshire) related some instances in which check-weighers had been removed from the pit bank for trivial reasons—one in which a man had taken a few apples from the garden of the manager, and another in which the cause of removal had been the fact of a man having placed a bill in his hat for the purpose of calling a meeting whilst a prohibition was in force against posting bills at the pithead. In the latter case the magistrates held that the words "otherwise misconducting himself" incriminated the check-weigher. The motion was supported by Mr. T. ASPINALL (Lancashire), Mr. S. WOODS (Lancashire), and Mr. D. REID (Durham). The two former brought before the meeting cases of unjust interference which had occurred within their own experience as check-weighers; and Mr. Reid asked whether it was competent for

colliery-owners to demand a scrutiny into the moral character of a man appointed as check-weigher as well as into his fitness as a workman for the position. He knew cases in which such a power was claimed.

The PRESIDENT said that the Act gave no such right of censorship. The resolution was adopted.

Mr. COWEY moved, and Mr. P. CARLIN (Durham) seconded, the following resolution:—"That with any alteration of the Mines Regulation Act, 1872, a clause be inserted giving the men the power to institute proceedings against owners and the management generally for any dereliction of duty or breach of the Mines Act in a similar way to the power now possessed by the owners and management in taking action against the workmen." The resolution was supported by Mr. W. PIGOTT (Lancashire), Mr. Woods, Mr. Sharp, Mr. E. A. RYMER (Forest of Dean), Mr. W. Abrahams (South Wales), and Mr. W. Crawford (Durham). The last-named delegate said there was a very pertinent and melancholy illustration of the need for a change in the direction stated in the calamity at Usworth Colliery, in Durham. At that mine a short time ago a manager was caught taking his lamp top off a few hundred yards on the inside of a caution-board which he himself had put up; but they felt their desire to prosecute in that case checked by the very roundabout means which they were compelled to adopt under the present Act, and it was only when they threatened to appeal to the Home Secretary that they got the case into Court.

The PRESIDENT observed that the motion would commend itself to all of them, and was one which the reformed House of Commons would deal with very speedily, though at the same time with strict regard to justice.

The resolution was adopted.

Mr. W. M. PICKARD (Yorkshire) moved the following resolution:—"That in any subsequent alteration of the Mines Act a clause be inserted giving power to relatives of persons killed in or about mines to appear personally or by deputy in the Coroner's Court, so that questions may be put to witnesses in order to elicit such evidence as may lead to a proper verdict by the Court." Mr. Pickard cited several recent instances of his having been refused by a coroner the right to put questions, whilst the manager of a mine had been permitted that privilege. Mr. J. TOYNE (Cleveland) seconded the resolution, and it was supported by Mr. Cowey and Mr. B. Pickard, Mr. T. Hindmarsh (Durham), Mr. Bailey (Derbyshire), Mr. T. Aspinwall, Mr. T. Hawkes (Lancashire), and Mr. P. Jones (Monmouth).

Mr. JONES said that he knew a coroner who was both an employer of labour and a colliery doctor, a double character which, in his opinion, could not be held without prejudice.

Mr. YOUNG (Northumberland) proposed the following resolution:—"That 'daily supervision of mines' in any new Mines Act be made to mean that a manager (certified) of any mine must enter and examine the mine and workings daily; and that he reside at or near such mine, so that he may at all times act promptly, as occasion may require." Mr. TOYNE seconded the resolution. He stated that a manager in the Cleveland district had six mines under his supervision. His rule was to visit each mine about once a week, and to get a note each morning from the overman at every colliery. He called that supervision under the Act.—Mr. HARVEY (Derbyshire) stated that several managers in his own county had so many collieries under their control that it was impossible for them to visit each daily.—Mr. W. M. PICKARD observed that at the present time it was difficult to know who was the really responsible manager of a colliery under the Act.—Mr. EDWARDS (South Staffordshire), Mr. B. PICKARD, Mr. T. ASPINWALL, and Mr. COWEY also spoke in support of the resolution, and it was carried unanimously.

The next subject on the agenda was that of changes in the law of conspiracy. In the course of the discussion, Mr. COWEY mentioned a case in which men had been summoned and convicted for quietly walking on the public road during a strike. They were deemed to be "watching and besetting" under the Act.

Mr. W. ABRAHAM gave the circumstances of an analogous case in South Wales. The complaint was made against three men, and when the case had been before the stipendiary magistrate for four days, had been sent to Quarter Sessions, and had then by the men's request been transferred to Assizes, the judge decided that the prosecution could not stand. These men, however, were now branded as conspirators, and had been unable to get work for four months. The case had cost the miners 160*l.*, and he thought there should be such an alteration of the law as would give men compensation who had suffered in the way described.

Mr. B. PICKARD moved, and Mr. W. MCKAY (Lancashire) seconded, the following resolution:—"That the law of conspiracy relative to magisterial applications be referred to the Central Board of the Miners' National Union for examination and consideration; and if any alteration more favourable can be made in the present law, the same be ultimately referred to the Parliamentary and Trades' Union Congress Committee." The resolution was agreed to.

The Conference was continued on Thursday. Mr. T. BURT, M.P., again presided. The subject discussed at the morning sitting was—"Are representatives of the workmen required in the House of Commons?" The CHAIRMAN said there was a general expectancy on the subject—a dark foreboding that the working classes would see their newly-acquired power to the detriment of national interests. In his opinion—and, indeed, he was sure in all their opinions—they had no such project in view. Whatever might have been the tendency of the House of Commons in the past, the people would act justly. They were not in favour of class representation; yet, as the House had been composed of interests, it could not be unfair for the working classes to claim an equal voice. Mr. Chamberlain's Shipping Bill was an apt illustration of the force of special interests. The capitalists generally combined for the overthrow of that Bill. As to the ways and means of sending working men to the House of Commons, he said that those who went would have to be supported by those who sent them. There was an idea in the minds of some people that a Member of Parliament had certain monetary privileges arising from being elected on committees and commissions. There was no payment for those duties apart from expenses, whilst calls for money were over and over again made upon members. People seemed to have the idea that the Member of Parliament had plenty of money at his command, and there were some working men who were desirous of measuring the payment to be allowed to representatives by the wages which they themselves received. He was sure there was no working man who held such views who did not feel that his wage was far below what it ought to be; and falling back on his own experiences, he said that the position of a Member of Parliament involved a greater outlay than many people appeared to be aware of.

Mr. J. TOYNE (Cleveland) moved—"That in the opinion of this Conference it is not only necessary, but imperative that the newly enfranchised working classes should use their political power for the purpose of returning the representatives of their class, and by themselves supported; not with the intention of subordinating any other interest, but with a view to placing themselves in a position to help on legislation peculiarly connected with the working classes, and to so shape the House of Commons that it may be the true expression of the opinion of the nation, which cannot be attained except all classes have some practical interest therein." Mr. COWEY (Yorkshire) seconded the motion, and urged his fellow-workmen to be united, and to send to Parliament men who would watch their interests. The representation of the people had been very one-sided in the past.—Mr. E. A. RYMER (Forest of Dean) supported the motion, pointing out that the people in his locality were becoming thoroughly alive to the necessity of acting unitedly on the question before them.—Mr. S. WOODS (Lancashire) thought that they had been too long satisfied with representation by men who cared but little for their interest.—The motion was supported by Messrs. JOHNSON and REID (Durham), D. ALFORD (Yorkshire), HARVEY, (Derbyshire), HOPKINS, (Nottingham), MCKAY (Lancashire), and others, and was carried unanimously.

In the afternoon the Conference considered the best means of procuring the return of the representatives of workmen and Mr. WILSON (Durham) moved:—"That, in our opinion, it is highly desirable for the purpose of securing the return of labour candidates



that workmen in each district or constituency should form an organisation as a means of carrying on a political education amongst the people, naming fit and proper persons having direct relations with the working classes as representatives, and for the purpose of providing a fund for the support of such persons."—Mr. G. Wood seconded the proposition, which was carried.

The following questions to be put to labour candidates were framed and adopted:—1. Will they vote for the amendment of the Mines Regulation Act?—2. Will they vote for a change in the Land Laws?—3. Will they vote for the Bill for the amendment of the Mines Regulation Act, as introduced by Mr. Burt, M.P.?—4. Will they vote for a Royal Commission to enquire into the amount of royalty rents paid, and the action thereof on mining and the industries connected therewith, with a view to bring about some change in the said rents?—5. Will they vote for the abolition of the London coal dues?—6. Will they vote for free education?—7. Will they vote for payment of members?—8. Will they vote for Mr. Broadhurst's Bill—the ratepayers to pay the returning officers' fees at elections, under specified conditions?—9. Will they vote for reform in the House of Lords?

#### REPORT FROM CORNWALL.

March 5.—Everything is so favourable in the matter of figures and prospects that the tone of expectation is far more hopeful than it was last week, when a fresh advance was confidently looked for. It is being still more clearly recognised, than some Fair Trade proposers have been in the habit of doing, that metals are not specially handicapped by the general conditions of trade, but that, on the contrary, so far as foreign competition in tin is concerned, it is a steadily lessening quantity.

Naturally in both Cornwall and Devon there is a good deal of mining leeway to make up as the result of the depression, and it is much to be regretted that the exodus of miners should have been resumed. Still, everything now points so distinctly in the direction of steady improvement that the special duty now is to make every effort to tide over what remains of the adverse time with as little friction as possible.

The example set by the adventurers in North Frances last week was worthy of all praise. They were not satisfied with the fact that the mine is making its way, and that profits are imminent, to put off dealing with their adverse balance. It is just that trusting to the future that has proved the bane of many promising concerns, and they would have none of it. The principle of the Cost-book was clear, and they carried it out. If that line of action had been the rule we should not be where we are now in many respects. Putting off till the rainy day has proved the worst mining policy.

Limited Liability is to have another trial under the auspices of Baron Grant at North Treskerby, a mine in a locality which abounds in mineral wealth, but has for years been under a cloud. For ourselves we are disposed very much to agree with the remarks of Mr. Heard at the meeting on the mine, that it would have been far better for Cornwall if Limited Liability had never been introduced here. No doubt the principle is sound, but so is the Cost-book; and so far the latter has been alone practically efficient in weathering the storm. If Limited Liability can do what is prophesied of it we shall be glad, and here it has another excellent chance.

So we are once more treated to some "talk" about the desirability of the mining interest seeking the aid of the Legislature—this time in connection with the question of rating. The Redruth Assessment Committee, as was stated last week, have come to the conclusion that they are under a legal obligation to rate remitted dues, and their clerk has actually been allowed to affirm unchallenged that "the Legislature never intended the bounty of the lords in remitting dues to result in a loss to the parish in the rates on those dues." We have waited to see if this point would be taken up; but no, there appears to be a hopeless feeling abroad of collapse under the inevitable, or at the best of asking the Mining Institute to have a discussion.

Now, it may seem presumptuous in a layman to question the accuracy of the opinion of a trained lawyer, but when that lawyer calls an act of bare justice and plain necessity an act of "bounty" it is quite clear there is something wrong somewhere, and one almost wonders that the argument was not carried a little further. If it is unfair to the ratepayers that they should lose the rates on dues the mines cannot pay the authorities might just as well insist that the adventurers are bound to carry on the mines to the bitter end of their leases, without power of surrender, that the rates may not suffer—in fact, that the mines should be compulsorily worked for rate-paying purposes if for nothing else.

But as this is being treated as a strictly legal question, and not one of common sense equity, how is that the effect of the alternative is overlooked? Does not the Act provide that where the provision for rating dues is not applicable a mine shall be rated at that amount at which it may be reasonably expected to let? And can it really be contended that a mine which is steadily making heavy losses can be reasonably expected to let at any rent at all? Mr. Peter evidently thinks both clauses of the section come to the same thing. That is the very question the mines should try. United action on one test case would settle the point. No amount of discussion will. Nor, after all, is the matter one for direct legislation. All this difficulty, and a score of others, arise from the fact that dues are not levied in the only honest way—on profits; and dues are not levied on profits because mining men will not make common cause. No profits, no rent; no rent, no rates. That is really the common sense of the whole matter; and although such a desirable consummation is, so far, only in the future, we hope that the Redruth Assessment Committee will not be allowed to pursue their intention unopposed. The point is worth fighting; and in any case it must be quite within the power of any lord and his lessees to deal with this matter in such a way as to put the assessors out of court once and for all. A little legal ingenuity in that direction would not be misapplied.

#### TRADE IN SOUTH WALES.

March 5.—There is not much to complain about in the condition of the Steam Coal Trade as regards Cardiff and Newport, but Swansea again shows a bad return compared with the previous week. Cardiff exported 123,743 tons foreign, and about 20,000 coastwise, with 6,880 tons patent fuel; Newport, 31,826 foreign, and 26,706 coastwise; Swansea, 11,775 tons foreign, and about 11,000 coastwise, with 7,405 tons patent fuel. Prices are somewhat weak, more especially for inferior qualities. The sliding-scale committee have fixed the rate of wages from March 1 at 2½ per cent. less than the previous four months, making a rise of 15 per cent. since 1879, instead of 17½ per cent. House coal is in slack demand, but small steam coal and patent fuel are in good demand. There is a glut of pitwood in the market, which has been sold as low as 15s. 9d. per ton.

The Great Western Colliery Company has just struck a 6 ft. seam of steam coal at Cilely, of excellent quality.

The Iron and Steel Trades remain in the same depressed condition. There were sent away last week 926 tons from Newport, and 337 from Cardiff. Iron ore has been received at Cardiff to the extent of 6979 tons from Bilbao, and 120 tons from other places. Newport received 10,390 tons from Bilbao, and 8000 tons from other places. Prices are very low.

There is great activity in the Tin-plate Trade at the present moment, and some of the works are reported to be in operation night and day. Makers are asking 14s. for IC cokes, and wasters are 1s. 6s.; steel plates, 15s. 6d.; charcoal plates, from 16s. to 18s. 6d. Black tin is advancing in price.

OBITUARY.—We have to record the death of Mr. S. Bastow at Harrogate at the age of 77. The deceased was well-known in the Hurtlepoole, being at one time master of the Middleton Ironworks, Cliff House Ironworks, and was connected with the erection of the largest warehouses in West Hartlepool, also with the deepening &c. of the docks, under the direction of the late Mr. Ralph Ward-Jackson. Mr. Bastow took an active interest in local matters, being at one time a Town Commissioner.

#### TRADE OF THE TYNE AND WEAR.

March 5.—The prospect for the Steam Coal Trade is improving, as it is likely that the Baltic trade will open out early. Contracts for the best steam coal are now pending, and colliery-owners will stand out for 10s. per ton. The house coal trade is depressed, and the price of this coal to local merchants has been reduced by 6d. per ton. There is not much change in the state of the gas or other branches of the coal or coke trades. The shipments of coals and coke at Tyne Dock have improved; the amount during the past week was 92,655 tons, an increase of 2573 tons on the quantity for the corresponding week of last year.

A dreadful explosion occurred on Monday night at the Usworth Colliery. This colliery is situated about 7 miles south-east from Gateshead. The shafts were sunk about the year 1845 by Sir G. Elliot and Mr. Johnsson. There are two shafts, and the principal seams were found in good section; the workings on the Maudlin Low Main and Hutton seam are very extensive. The east shaft is used entirely for drawing coal, this shaft being divided into two sections, and two winding-engines are employed in drawing the coal from the various seams. The west pit is the upcast for ventilating purposes, and here a very fine Guibal fan was erected by Sir George Elliot and Co. some years ago. At the time this fan was erected it was the largest ventilating fan in this county, it being 45 ft. in diameter, and the amount of air in circulation was very large. The colliery was considered one of the best ventilated and best conducted works in the district. Some time ago the colliery was sold by Sir George Elliot and Co. to the well-known firm of Mr. John Bowes and partners, Mr. C. M. Palmer, M.P., being the acting owner of the firm, and Mr. A. S. Palmer, the youngest brother of Mr. C. M. Palmer, was appointed chief manager, and he has since that time resided near the works, and he has, of course, directed all the operations.

Mr. A. S. Palmer was trained as a colliery viewer under the late Mr. (Nicholas) Wood, at Killingworth, and other collieries, and he has had many years' practical experience in this county, and also in other districts. About the year 1854 a serious explosion occurred at the Risca Colliery, in Monmouthshire, and he was appointed to open out those remarkable works and reinstate the place, and he was manager there some time after completing his arduous task. Since that time he has been engaged as manager at the extensive Wardley Colliery, and other coal mines in this district, and the unfortunate explosion at Usworth is the first serious accident that has occurred under his management.

At the Usworth Colliery, then under the management of Sir George Elliot, an explosion occurred in the year 1850, when 13 lives were lost. Since that time the works have been safely carried on, and a very large business done. By the present explosion 38 lives have been lost, and it was very fortunate that the occurrence took place in the night shift, when only stone men and shifters were employed in preparing the workings for the first shift of hewers, who had to descend at 9 o'clock P.M., and it is very remarkable that these men were on the bank ready to go down, and the first cage of men were actually about getting into the cage when the explosion occurred. If it had occurred half an hour later it is quite possible that upwards of 100 men and boys might have lost their lives.

The explosion has been of a very violent character as is proved by the fact that the main road in the Maudlin seam has been wrecked outwards to the shaft, and the shaft gearing also seriously damaged so that it was impossible to work the cages, and access was only got to the workings by means of a small back shaft near the main coal working shaft, and in this shaft a kibble was worked by which three men could be sent down and also up the shaft at one time. By this means all the men in the workings in the district not affected by the fire were safely brought to bank.

At the present time one of the cages has been got to work in the main shaft (Wednesday 4 o'clock P.M.), so that the means of communication with the workings is more rapid, and the explorers have got through some heavy falls, and got to a point 1000 yards from the shaft, but it is expected that they will have to penetrate about a mile further before they can reach the men who are entombed. Only four dead bodies have been recovered, two of these men having been engaged as explorers, and it is expected that 40 lives have been lost altogether.

The most remarkable episode in connection with the exploration is the attempt of Mr. Lindsay, assistant viewer, with two assistants to penetrate the workings by travelling along the return air course. It appears that Mr. Lindsay formed the idea early on Tuesday morning that if the men in the workings were alive they might have attempted to escape by the returns, and he and his companions travelled a great distance, about 1000 yards, and found the road all right, but could not find any men, and on returning they were all overpowered by the after-damp; but fortunately Mr. Hedley and others went in search of them and rescued them, but in a very exhausted condition. Mr. Lindsay was recovered by Dr. Wilson, who descended the shaft for the purpose of attending to him, but the other two men, Donnelly and Slee, were beyond recovery.

The conduct of Dr. Wilson was nothing short of heroic; he was asked by Mr. Palmer to go down, and he at once complied with his request, although only a practised miner could be expected to go down this back shaft in a small kibble.

There is a better feeling in the Iron Trade, and the downward movement has been checked, but only where a point has been reached nearly as low as ever experienced. Makers ask 34s. 6d. per ton for No. 3, and warrants can be had for 34s. Messrs. Connell's stock is 50,962 tons, a decline of 20 tons upon the week. On Tuesday the market was firm at Middlesbrough, and closed steady. The shipments of pig-iron for February have been fairly good, although they were about 6000 tons less than in February last. The deliveries to Scotland were over 30,000 tons, but they declined in a marked degree to South Wales. To some foreign ports, however, they were larger, chiefly to France and Holland, as the German trade has not yet opened out much.

The Manufactured Iron Trade is still quiet, and the demand sluggish. The steel trade is improving, and there is a very good demand for plates, and manufacturers have been able to advance their prices. The iron shipbuilding trade is gradually improving, and freights are also improving, which is a very hopeful feature, although there are some vessels still laid up. The price of steel rails is 47. 15s. The rates of manufactured iron are at a minimum. The pipe and chair founders are pretty busy, and some more enquiries have appeared for engineering work.

The sudden death of Mr. Douglas, who has been a principal manager at Messrs. Stephenson's works, so long in Newcastle, has caused much regret. He was a very active and energetic man, and he has struggled hard to keep the works going in the late adverse times.

THE half-yearly Crown rent audit and gale dinner of the Forest of Dean was held last week. Mr. G. E. Francis, the Crown receiver, was present, but Sir James Campbell, Bart., presided at the dinner which followed, and Mr. Arnold Thomas, Foxes Bridge Colliery, occupied the vice-chair. Amongst those present were Mr. T. Foster Brown, Cardiff, and deputy gavelier of Dean Forest; Mr. Edwin Crawshaw, Lightmoor Collieries; Mr. F. Brain, Trafalgar; Mr. Hayes, Lydney and Crump Meadow Colliery; Mr. W. H. Phillips, Dowlais Iron Mine Company; Messrs. G. W. Keeling, Severn and Wye Railway; and E. M. Letcher, Great Western Railway; Iltyd Thomas, and T. Llewellyn, Crown Offices, Coleford; Messrs. Frederick, Arthur, and Edwin Morgan, Cinderford Furnaces and Lightmoor Collieries; Mr. F. Clarke, and about 30 other galees, &c. After the usual loyal toasts, Mr. F. F. Brown proposed "Prosperity to the Coal and Iron Interests of the Royal Forest of Dean."—Mr. Crawshaw replied.—Mr. Thomas replied for the coal trades. Other toasts followed.

GOLD MINING IN QUEENSLAND.—A splendid crushing is reported at Mount Morgan, the return being over 7 ozs. to the ton. A new reef, 3 feet thick, has been struck there recently. The Day Dawn Block and Wyndham Company, Charters Towers, have crushed in a fortnight 429 tons, yielding 930 ozs. gold. A dividend of 1s. 6d. per share was declared. The local banks purchased during one week 2563 ozs.

#### REPORT FROM LANCASHIRE.

March 5.—Business continues to drag on, both in the Coal and the Iron Trades of this district, in a very depressed manner, and any prospect of improvement seems to be as distant as ever. The enquiry coming forward, either for pig or manufactured iron, continues very small, and where business is done it is at extremely low figures, with deliveries in some cases 'extending over the whole of the year. The prices at which, in the open market, business is only possible are, in fact, so low, that some of the leading pig-iron makers decline to entertain them, and content themselves with a few occasional special orders upon which they can get something near their list prices; but there are very low sellers in the market. Between finished iron makers and merchants there appears to be a struggle going on with regard to a further reduction in list rates which the dealers are endeavouring to force on. Although many of the manufacturers declare that they have already got to the lowest possible point, and that they would prefer to stop their works rather than attempt to keep going at lower prices, the tendency of prices is in the direction of a further downward move, and in some cases orders have been taken at 2s. 6d. per ton under the figures that makers have recently been holding for. The average prices for delivery equal to Manchester are about 40s. 6d. to 41s. 6d., less 2½, for good local and district brands of pig iron, with sellers in some cases at 1s. under these figures, and 57. 7s. 6d. to 57. 10s. for good qualities of local and North Staffordshire bars.

With regard to the condition of the Engineering Trades, there is no material change to report; railway carriage builders are getting plenty of new orders; but in wagon building there is not much new work going on.

In the Coal Trade the demand for all classes of fuel is extremely dull. Nominally list rates remain without change, but generally there is an easier tone, and stocks are pressed for sale at excessively low prices. All descriptions of round coal, both for house fire and general manufacturing purposes are moving off very slowly, and in engine fuel the depression in the salt and chemical trades is causing a large quantity of slack to be thrown upon the market, and in some cases this is becoming rather a drag. At the pit mouth best Wigan Arley can be got at 8s. 6d. to 9s.; inferior sorts and ordinary Pemberton Four-feet at 7s. to 7s. 6d.; common round coals about 5s. 6d.; burgy, 4s. 6d. to 5s.; best slack, 3s. 9d. to 4s.; and common sorts, 2s. 6d. to 3s. per ton.

For shipment there has been only a very poor demand during the past fortnight, and very low prices are being quoted to effect sales. For the better qualities of steam coal delivered at the High Level, Liverpool, or the Garston Docks, 7s. 3d. to 7s. 6d. per ton is still asked, but prices as low as 6s. 6d. to 7s. per ton have been taken.

#### REPORT FROM NORTH AND SOUTH STAFFORDSHIRE.

March 5.—Numbers of the collieries are not working more than on an average three or three and a half days a week. This is sufficient indication of the state of the demand. And even for this limited amount of work prices have to be accepted which are getting worse almost week by week. Common forge coal may now be had at less than 5s. 6d. per ton, long weight. Furnace coal is 8s. to 10s. Cokes and ironstone are in tame sale. Welsh furnace coals (best) are 14s. delivered, and North Staffordshire gas coals 10s. per ton. Ironstone from the Northampton mines is 5s. 6d. to 6s., delivered. Pigs are changing hands in 500 ton lots, but at rates that leave a bare profit to the producers. Indeed, it is questionable whether some of the business is not being done at an actual loss. Some Derbyshire pigs are to be had this week at less than 40s. 9d., delivered, though superior sorts are 42s. Northampton are 39s. to 40s. Native cinder pigs are here and there as low as 35s. per ton. The finished iron trade does not present any new features.

A monthly meeting of the Mines Drainage Commissioners was held in Wolverhampton, on Wednesday. Mr. Raybould again enquired what steps were being taken regarding the cost of pumping the Bromley Pound, Kingswinford. He was informed that the committee appointed had been making investigations, and it was probable that their report would be sent in early. Upon the suggestion of the Chairman it was decided to write to the committee, asking them to present their report before the next meeting.

An important movement is on foot in the local coal trade. The Executive Council of the Midland Counties Amalgamated Trades and Labour Association have been corresponding with the employers touching the advisability of seeking to make an arrangement to prevent further wages disturbances. The masters reply that they are willing to meet a number of the working men to discuss the matter, but they decline to meet any of the representatives of the late Coal Trade Wages Board. It is expected that shortly the desired meeting will be held.

During the holding of the National Conference of Miners in Birmingham this week, the President (Mr. T. Burt, M.P.) expressed the opinion that the Franchise Bill would increase the number of miners' representatives in Parliament. Resolutions of sorrow at the fatal explosion at the Usworth Colliery, Durham, were unanimously passed.

The shareholders of John Bagnall and Sons (Limited), West-bromwich, have adopted a scheme of reconstruction, and the requisite application is to be made to the Court of Chancery to stay further liquidation proceedings. The company is to be reconstructed by the subscribing of 20,000l. of capital, and the writing off as lost of the total amount of capital paid and credited on the original A and B shares, which will be cancelled. Out of the new capital and the profit of 12,000l. earned during the past year the mortgages on the estate will be reduced to 20,000l.

THE MANCHESTER THIRLMERE WATERWORKS.—In the present depressed state of the iron trade it will be interesting to know that the Manchester Corporation has at length decided to push forward the construction of the works for obtaining a water supply from Thirlmere Lake, which will involve the giving out of very large orders for cast-iron pipes for the conveyance of the water from the lake to Manchester. Mr. G. H. Hall, C.E., who has had large experience in connection with waterworks in the North of England, and who, in partnership with Mr. Bateman, C.E., had the carrying out of the Longendale Works, has been appointed the engineer for carrying out the Thirlmere scheme, and is now busily preparing the necessary plans with the view of commencing operations early in the spring. The water is to be brought by an aqueduct 7 ft. diameter, which will follow as nearly as possible the contour of the land; where it is necessary to cross any valley syphon pipes will be laid, and some of the large mountains will be pierced by tunnels.

COLLIERS' WAGES IN SOUTH WALES.—Notices addressed to all enginemen and stokers in the employment of the South Wales and Monmouth coalowners have been issued, terminating contracts in a month. This step has been taken in view of the 2½ per cent. reduction which is to be enforced.

ON Saturday there was launched from the shipbuilding yard of Messrs. Harland and Wolff, Belfast, the sixteenth vessel for the White Star Line. The vessel is named the Gaelic, and is a duplicate of the Belgic, which was launched from the same works for the same company on Jan. 3 last. The Gaelic in her general appearance corresponds in all respects with that of the well-known vessels of the line, having a graceful yacht-like hull, with ample beam, four masts, square-rigged on three, thus providing effective sail-power in case of any break down of the machinery fully equal to that of a first-class sailing ship. The Gaelic is built of mild steel, and her dimensions are:—Length, 420 ft.; breadth, 42 ft.; depth, 29 ft. 6 in.; and gross register tonnage about 4500. She will have two double cylindered engines of 400 horse-power, also built by Messrs. Harland and Wolff, the steam for which will be supplied from three elliptical boilers working at an initial pressure of 90 lbs. to the square inch, but tested by the Board of Trade to double that pressure, and capable of bearing even much greater pressure than the maximum official requirement. The vessel will be lighted by electricity.



# ALLUVIAL MINING ON THE WEST COAST OF NEW ZEALAND.—No. I.

From the Otago Daily Times we take the following interesting description of mining operations on the West Coast:—The West Coast of the Middle Island is such an isolated spot that few residents in other parts of the colony have any clear idea as to the nature and extent of the gold seeking operations now carried on there. Most are inclined to regard Hokitika and its neighbourhood as a worked out diggings; and although they have heard about vast coal beds in the Grey and Buller, and know, perhaps, more than they like to know about reefing speculation at Reefton, few have any knowledge of the really vast operations undertaken by several joint stock companies in the neighbourhood of Hokitika, in order to carry on sluicing on a large scale. I doubt whether it would be possible to find their equal in magnitude in Australia, and to do so it would be necessary to travel to California. In fact, it is from California that the idea was evidently borrowed to acquire extensive areas of known auriferous ground, and by the expenditure of large capital bring in an ample supply of water to sluice away the terraces into the river beds. The scene of the operations of one large company on the coast is at Humphrey's Gully, about 10 miles from Hokitika: 200 acres of land form the company's claim, their capital is 150,000*l.*, and for the last three years, in the face of great difficulties, they have persevered in their efforts to bring in a large water supply from a distance of 6 miles, part of it through a tunnel piercing a great hill for a distance of 58 chains. As will be seen further on, this project is now close to its fulfilment, and the question will then be tested whether sluicing on a grand scale can be made to pay in New Zealand as it does in California. In the latter country many large sluicing companies have carried on profitable operations with a yield of gold averaging 3*d.* per cubic yard. The thickness of their wash dirt varies from 40 ft. to 260 ft. The thickness of the wash dirt in the Humphrey's Gully Company's ground is from 150 ft. to 500 ft., and is described by independent experts to be of the most valuable character with regard to ease of working and probable yield. The top stuff, removed in fixing temporary tail-boxes, yielded an average of nearly 4*d.* per cubic yard for all the ground shifted, and it is stated that on either side of the present tail-race the yield obtained where the reef was worked in shallow ground has run as high as 1*l.* per cubic yard, 110 yards on one side giving 14 ozs., and 200 yards on the other 20 ozs. 5 dwts. At Ross, about 20 miles south of Hokitika, several companies are at work, some of them getting fair returns. The largest is the Ross United, with a capital of 150,000*l.*. This company holds a mining lease of 100 acres, and have brought out a large number of adjoining claims, so that they now hold the whole of Ross flat. At one time the richest gold workings on the West Coast were situated on this flat. Famous among them was the Cassius claim, which in 35 weeks returned to its lucky sole owner, Mr. Michael Cassius, 4772½ ozs. of gold. Three companies on this flat, during 32½ weeks' working in an area of less than 7 acres, obtained 11,543½ ozs. They were all flooded out when yielding their best through the failure of the drainage machinery, and the flat has never since been worked. The Ross United have now succeeded in solving the problem of draining the water out of the flat and into the sea, and having sunk a shaft 392½ ft. deep through eight gold bearing layers, are now driving to find some of the rich runs already proved to exist in their ground. Should these projects prove successful they will open up a great future for alluvial mining in New Zealand; if they fail, it goes without saying that very many people will lose heavily. The unforeseen delays in completing the preliminary works, and the severe calls on shareholders, have caused some impatience and anxiety, and no doubt the following account of the present state of affairs on the ground will be of interest not only to shareholders, but to all who take an interest in the progress of mining industry. I may say that I visited the claims absolutely unfettered by any instructions or restrictions, and having no money interest in the success of the companies, my report can be taken as thoroughly impartial. The Chairman of the two principal companies (the Hon. J. A. Bonar) and his co-directors gave me every facility for making a thorough investigation. My opinion of the undertakings is that they are thoroughly *bona fide*; the substantial nature of the works, and the heavy interest held by the original promoters show that these companies do not partake of the shady character of too many West Coast mining projects which have fleeced the unwary.

The first company I will deal with is

## THE HUMPHREY'S GULLY UNITED GOLD MINING COMPANY (LIMITED)

The ground held by this company has been known to be payable auriferous for many years, but, owing to the want of water supply, was never properly tested. One private company of miners attempted to bring in water by what is known as the Caledonian race, but the difficulties of getting the water round the hill now being tunnelled by the company proved too great.

The first attempt to work Humphrey's Gully on an extensive scale was made in the latter part of 1881. Mr. Brentnall, C.E., was employed to report upon the available water supply, and having explored the watershed of Mount Tuhua for a distance of about 7 miles from the claim, he reported that 13 creeks could be tapped, giving a constant supply in dry weather of 12 to 14 Government heads of water. The facilities for storage were good, there being an excellent site for a large dam on Granite Creek, 6 miles from Humphrey's. There were no engineering difficulties in the way of race construction and the cost of maintenance would be very small. Mr. Brentnall also reported that the auriferous sluicing country which such a race would command and supply was the largest yet opened in Westland. As showing the value of this auriferous country, the workings in Greek's Gully—1 mile lower down the Arahura River than Humphrey's—were referred to. This ground had been opened for 16 years: several parties were then working, one of which (the Enterprise) commanded the whole supply—only amounting to three heads for half the year. The face was about 40 ft. in height, and a large area was unworkable for want of water. Coarse gold was obtained, samples up to 13 dwts. being procured, and also a nugget weighing 37 ozs. In Humphrey's, McDonald's, and German Gullies a large extent of auriferous ground had been proved, and in one claim the depth of wash dirt was 300 ft. In view of the dimensions since attained by the company's operations, it may be of interest to read the figures given as the probable cost of a race to carry 50 Government heads of water. The total cost was to be 15,000*l.*, 2400*l.* being the cost of tunnelling, and 2000*l.* for dams.

A company was formed in December, 1881, with a capital of 30,000*l.*, in shares of 1*l.*, to bring in a water-race sufficient to supply an area of 5 square miles of auriferous country in the neighbourhood of Humphrey's, and to work an area of 100 acres, which had been granted under a 21 years' lease to the Humphrey's Gully Water-race and Gold Mining Company (Limited). The proposal was to sell 40 heads of water to other parties, which would yield a revenue of 6240*l.* per annum, and to work the company's ground with the remaining 10 heads. It was estimated that the company's claim would yield an annual return of gold to the value of 4800*l.*. The first permanent directors were the Hon. J. A. Bonar (Chairman), Messrs. P. L. Dignan, W. G. Johnston, M. L. W. Jack, J. Pearson, J. Clarke, and G. A. Paterson (of Hokitika), and M. P. Comiskey (of Auckland); Mr. J. Gibson (manager). The same gentlemen still hold office, with the exception of Mr. Paterson. During the first year 12,000*l.* was called up, and the main works of the company taken in hand. Among these the most important was the "long tunnel," 58 chains in length, which has ever since proved a stumbling block to the company. Two contracts were let for driving the tunnel at each end, in May, 1882, and the time fixed for its completion was April, 1883. In January, 1883, it was too evident that the tunnel would not be driven in the specified time. In that month about 14½ chains of the inlet end contract was completed, and no serious obstacle was met with, but at the outlet end trouble had begun, and very little progress was made. A contract had also been let for 3½ miles ditching, to be finished in March, 1883. Plans and specifications had been prepared for a very large work, known as the "long flume," 50 chains 21 links in length, and a contract let for the supply of timber for the flume, consisting of

212,000 ft. of heart of red pine. In 1882 the company purchased the extended claim and rights of O'Neill and party to McDonald's Creek, together with a partly-constructed race, and the claims of three other parties which were in the centre of the company's lease. This caused an extra expenditure of over 9000*l.*, so it was becoming apparent that the affair was fast outgrowing the modest dimensions of the first project.

The directors announced by circular on May 10, 1883, that for some time they had had under consideration the desirability of increasing their supply of water in order to carry out operations on a more extensive scale than at first contemplated, but as the undertaking was proving more costly than had been anticipated, the present capital would be insufficient for the completion of the original scheme. The proposals of the directors were:—To acquire two large adjoining claims—Clarke's lease of 60 acres and the Miners' Amalgamated Sluicing Company's 29 acres; to wind up the existing company, and to form a new one, not under the Mining Companies Act, but as an ordinary joint-stock company registered under the Companies Act, 1882. The capital to be 150,000*l.*, in 150,000 shares of 1*l.*, allotted as follows:—45,000 fully paid up shares to the Humphrey's Gully Water-race and Gold Mining Company; 20,000 fully paid up shares for Clarke's lease and water rights; and 12,000 fully paid up shares to the Miners' Amalgamated Sluicing Company. This left 73,000 shares to be allotted as contributing shares, and it was believed that the proceeds would be more than sufficient to meet the liabilities taken over, and to carry on the company's extended waterworks to completion. These proposals were carried into effect; the necessary capital was readily subscribed (shares being now largely held in Dunedin, Auckland, and London), and the original company was succeeded by the Humphrey's Gully United Gold Mining Company (Limited).

From an interim report published by the directors of the new company on Nov. 13, 1883, I learn that at that date the outlet end of the long tunnel had been driven 8 chains, where it had practically been brought to a standstill owing to a drift of quicksand, known locally as "pug." The directors were obliged to take over the work from the contractors, and avoid the "pug," if possible, by means of a deviation from the straight line of the tunnel, in carrying out which they had obtained the advice of Mr. W. N. Blair, M.Inst.C.E. The inlet end of the tunnel had been driven 18½ chains, and work was proceeding; 3½ miles of ditching were completed, the long flume was approaching completion, a contract had been let for 3½ miles of open ditching, which connected the race with the dam site at Granite Creek; tenders had been called for the construction of the dam, and considerable progress made towards opening up the ground where it is proposed to carry on sluicing. Ten acres had been cleared of bush, and a temporary tail race paved with iron blocks laid down a distance of 4½ chains to the face of the terrace: 165 ozs. of gold was extracted from the narrow strip of ground removed in bringing up the tail race, and this may justly be regarded as a proof of the richness of the ground held by the company. On reaching the terrace, which shows a depth of 200 ft. of "wash," a shaft was sunk and bottomed at 30 ft., to which level it was decided to lower the tail race and permanent boxes.

The first annual report and balance-sheet of the new company were issued on March 22, 1884. From the date of incorporation up to March 11, 1884, 21,380*l.* 17*s.* had been called up, and the expenditure during the same period is put down at 15,731*l.* 5*s.* 3*d.*. The new engineer of the company, Mr. D. W. McArthur, C.E., reported on March 22, 1884, that the advice of Mr. W. N. Blair had been acted on with success, that the "pug" was finally mastered, and that the tunnel would be completed in four or five months from that date. The estimate then to be driven between both faces was 21:39 chains. This estimate proved too sanguine. On Sept. 11 last it was reported that "pug" had again made its unwelcome appearance, and that another deviation was in progress to avoid the difficulty. At that date the length of tunnel required to be driven was 8:86 chains.

The foregoing sketch of the company's history and operations will explain the position of affairs, according to latest information, up to the date of my visit.

## THE COMPANY'S CLAIM.

I left Hokitika to visit the company's ground on Nov. 27 last, and after driving over an excellent road through pine forest for a distance of about 10 miles arrived on the leasehold in Humphrey's Gully. We put up the horses at the hostelry rendered famous by the great Archibald Forbes in his article on "Doughtown Scrip." Here we are shown a splendid sample of coarse gold found in the neighbourhood by a private party of miners, and are assured that there is plenty of the same article to be got when water is abundant. We listen to some forcible, if not polite, remarks concerning Mr. Forbes' account of his visit, and find that the natives are very much astonished at his preference for fiction, as is evidenced by his story of an imaginary visit to Doughtown, and lecture delivered to the admiring population thereof. The obliging Boniface provides himself with pick and tin dish, and leads the way to the "face" in McDonald's Gully. In a few minutes we find ourselves on the spot where the terrace has been exposed for a height of 230 ft., showing an immense body of wash-dirt consisting of fine gravel. There is a marked absence of large stones or boulders, which are found to be a great hindrance in sluicing operations on the coast—notably at Kumara and Ross, where they have often to be broken up with dynamite before they can be washed down the tail-races. When this face has been sluiced away by means of giant nozzles it is estimated that the wash-dirt on the face of the hill at the back will measure the astonishing depth of 500 ft. To this face a temporary tail-race has been cut, and, as already stated, 165 ozs. of gold was obtained from the strip of ground removed in the operation. The boxes are of a very large size, being 3 ft. 6 in. wide by 2 ft. 6 in. deep. They are paved with iron bottoms, alternating with a chain cable and iron rails 6 ft. long. From this point we get a view of the area secured as a tailings site—a matter of very great importance to a company contemplating such extensive sluicing operations. There is a fall of 166 ft. from the end of the permanent boxes to the Arahura river, which is distant 30 chains; and the company has acquired a tailing site area down to the river of 80 acres. This is exclusive of McDonald and Humphrey's gullies, which are proclaimed tailing sites. The total area of ground now held by the company, which will be worked by the race when the tunnels are through, consists of a compact triangular block of 200 acres, the thickness of the wash-dirt varying from 150 ft. to 500 ft.

Before leaving the tail-race site we washed a few dishfuls of sand and gravel, taken at random, and got very good prospects. Climbing to the top of the face we came to a track running alongside O'Neill's race, and a short, brisk walk brings us to the mouth of the Long tunnel, at the outlet end, where all the trouble has occurred. Here we find a cluster of huts occupied by the men engaged in driving the tunnel, and meet Mr. McArthur, the engineer, who is under orders to remain on the spot until the dreaded "pug" is conquered. The tunnel is 6 ft. high, and 4 ft. 6 in. wide. It is strongly timbered right through, props and caps being left every 3 ft. The laths are perfectly dressed, and closely packed with moss. The first stoppage through meeting with wet pug occurred when about 8 chains had been driven at the outlet end. By means of deviations the difficulty was overcome, and good progress was made until a distance of a little over 14 chains was driven. The old enemy reappeared, and deviations on the right and left hand sides were again driven, and firmer ground was found in the left side deviation. On the day I visited the tunnel the distance driven was 16 chains 25 links, and they were thus 120 ft. beyond the point at which the last stoppage occurred. The rate of progress is now about 42 ft. per week.

At the inlet end of the tunnel the difficulties have not been so serious, and it has been driven a total distance to date of 34 chains 89 links. At this point a wet grey reef has been encountered, and as the tunnel at this end is of course driven down hill, there has been a considerable accumulation of water; and pending the construction of a syphon, driving at the inlet end has been suspended for the last three months. A syphon, 6 in. in diameter and 23 chains long, is being constructed, and Mr. McArthur stated that he expected it would be completed in a fortnight. When the water is drained off, the timbering of the tunnel at this end will be completed and driving resumed.

It will thus be seen that on Nov. 27 there was 6 chains 86 links to be driven in order to finish the long tunnel. As sluicing operations cannot be started until this tunnel is through, and as all other works are about ready, the probable date of the completion of the tunnel is the all-important question for shareholders. Taking the present rate of progress at 42 ft. per week, as given by the engineer, the work should be done in 10 weeks from the date given above. At any moment, however, another stoppage might occur in the present drive; but against this contingency has to be placed the strong probability that driving will be resumed at the inlet end in a fortnight. Ten weeks, therefore, appears to be a reasonable estimate for the completion of this troublesome work.

Branch Race and Tunnel.—The construction of a branch race and tunnel has been begun, to carry a supply of water from the main race at the inlet end of Long tunnel through the hill to a convenient point for sluicing that part of the company's property known as Clarke's lease. This means of conveying water might have been used to work all parts of the company's property, and no doubt would have been if Long tunnel had proved a failure. But there is a considerable sacrifice of fall as compared with Long tunnel. The total length of this branch, race, and tunnel is 2 miles 23 chains, and it is designed to bring 40 heads of water on to the southern portion of the property. The tunnel is 30 chains long. On the date of my visit it had been driven 7 chains, and was reported to be progressing steadily.

The Head Race.—On the following day I made an early start on horseback to visit the works on the other side of the range pierced by Long tunnel. I proceeded along the banks of the Kanieri river to a point whence it emerges from the Kanieri Lake, distance about 11 miles from Hokitika. I was fortunate in respect of weather, and had a charming view of the lake, which, although small, will bear comparison, for beauty and grandeur, with many better-known and vaunted New Zealand lakes. Its shores are formed by small rounded hills, covered with the rich, dense timber of the West Coast, and a noble background is furnished by the rugged sides and snow-capped peaks of the Alpine range. With some reluctance my two companions turned away from this picturesque spot, and led me into the bush in the direction of the prosaic Doughtown. This trip through the bush had been alluded to several times in an ominous way, and I could not understand why the last 2 miles of the journey seemed to be looked forward to with some degree of terror by my guides. I was soon enlightened. The bush track was one of the vilest I have seen in New Zealand, which is saying something. After a vain effort to get our horses through a swampy piece we left the animals in charge of a roadman, and tramped through the swamp and scrub for about an hour, sustained by a conviction that we rivalled the martyrs of old, as far as suffering was concerned. We were not sorry when the Milltown clearing came in view. This brought us to a central point in the works which lie above the Long tunnel.

From the inlet end of Long Tunnel there are 2½ chains of fluming and a large open ditch cut, 5 ft. wide by 5 ft. deep, for a distance of 2 miles, at a cost of 30*l.* per chain. At this point Doughtown is reached, and the water will here be carried for five chains along a large flume 6 ft. wide by 5 ft. deep. The water is again carried in the same kind of open ditch as before described, properly timbered where the ground is soft, until we come to what is known as

## THE LONG FLUME.

This work, which is about 5 miles above the claim, presents a very imposing appearance, and is a striking evidence of the magnitude of the company's enterprise. A first glance at the immense timber which support the aqueduct high up in the air, conveys the idea that you are looking at a bridge carrying a railway across one of the broad rivers of Canterbury; and it takes some time to realise the fact that this structure has been raised, not by a Government with borrowed millions in its purse, but by a few enterprising men determined to sluice away the golden terraces on the other side of the hill. This aqueduct was necessary in order to carry the water over a deep, wide depression, forming an extensive forest swamp, and all the timber used in its construction was cut in the neighbourhood. The timber used is heart of rimu, cut in proper season, and has proved very suitable. The contract for the supply of timber for this work was for 212,000 ft., and the total cost of the work 7000*l.*. The length of the flume is 50 chains 21 links, the height from the ground in some places 44 ft., and the props average 12 in. square. The flume has a carrying capacity of 150 heads of water. From the inlet end of the flume to the dam there is open ditching again, but of somewhat smaller dimensions, as there is here a greater fall. The average fall over the whole race is 8 ft. to a mile. From the inlet end of the Long Tunnel up to the end of this piece of ditching—a distance of 5 miles—the race is complete, and ready for work at a moment's notice. In wet weather it has been running full with water, and the ditching has borne the test well, the hard cemented gravel through which most of it is cut proving very firm. The race has occasionally been used for rafting timber required on the works lower down.

## THE DAM

Is situated on Granite Creek, 6 miles from the claim, and the real water supply is obtained from this point upwards although a small supply is obtainable lower down from a few creeks. A favourable site has been obtained, covering an area of 11 acres 25 perches, and the dam is estimated to hold 5,500,000 cubic ft. of water, equal to 55 Government heads of water for 24 hours, or 165 Government heads for eight hours. The embankment is now in course of construction at a point where two terraces converge, the distance between them being about 3 chains. It is 180 ft. broad at the base and 8 ft. at the top, with stone pitching for the inner slope. The greatest height is 35 ft. The slope on the inner side is 3 to 1, and on the outer 2 to 1. The puddle wall, for which excellent clay is found in the neighbourhood, is 16 ft. wide at the base and 4 ft. at the top. The inner end of the off-take tunnel is very substantially built of concrete, the cement for which had to be packed up to the site. The dam will cost 6000*l.*, and Mr. Price, the contractor, says he will have it completed in the contract time, which is two months hence.

Granite Creek, in the bed of which the dam is built, will supply. It is estimated, 20 Government heads of water. Mr. Price's contract includes the construction of a race for 2½ miles above the dam—that is 8 miles 22½ chains. This will intercept a number of creeks sufficient to supply water for sluicing two faces as soon as Long Tunnel is through. There are at present 80 men at work on Mr. Price's contract.

A further extension of this head race is contemplated, so as to bring in Mount Brown and Brentnall's Creeks. That would be to a point 3 miles beyond the contract now in hand. This, it is estimated, would more than double the supply of water. Further on the creeks are numerous, and the Arahura river is only 3 miles distant from Brentnall's Creek. As there are no engineering difficulties in the way of bringing water from the river at that point, there can be no question that available water supply is unlimited.

We had now completed our inspection of the upper works, and returned to Milltown. We retraced our steps painfully through the bush track, and rode leisurely back to Hokitika late in the evening, all feeling satisfied that we had done our work faithfully, and spent a very pleasant, although somewhat fatiguing, day.

The next place I visited was the town of Ross, about 20 miles south of Hokitika. This is the centre of several large sluicing companies, some of which have obtained very good returns for years past from the alluvial terraces surrounding the town. The Government have spent large sums of money in this neighbourhood in constructing the Mokihinui water race, but up to the present time the expenditure has been very unproductive, owing to the unfinished state of the work. The principal mining operations have been carried out on the flat on which the township is built, and in order to explain the position of affairs at the present day it will be necessary to give a full account of the various attempts made to unearth treasures which undoubtedly lie hidden in this field.

Ross Flat is about 1 mile from the sea coast, and was worked at an early date in the history of the Hokitika gold fields. On the southern and eastern sides of the Flat run Donnelly Creek and Jones



Creek. The latter runs through the centre of the Flat, and joins Donnelly Creek at its lower end. Both creeks proved to be highly auriferous, and in Jones Creek especially very rich deposits were found. In working the bed of Jones Creek the gold was first traced into the Flat, which was speedily rushed, and nearly all marked off in ordinary mining claims, worked by manual labour or by the aid of horse-whims. A remarkable feature of the newly-discovered field was that no regular leads, or runs of gold of a certain width, were found, but the gold appeared to be very evenly distributed in layers all over the Flat. Some of these layers averaged about 5 ft. in thickness; in some cases there were layers 6 ft. to 8 ft. thick. These small claimholders worked the ground profitably until the sinking got deep. The inflow of water increased rapidly, and a horse-whim was found to be quite insufficient to bail out the shaft. It was evident that some different mode of working was necessary, and several applications were made for gold mining leases. After strong opposition from ordinary claimholders the leases were granted, and in 1866, for the first time on the coast, registered mining companies were formed. The most important of these was the Morning Star Gold Mining Company. Its promoters were a small party of working men, who sank a shaft 104 ft. deep in the centre of the Flat. At that depth a gold-bearing layer was struck, but the water increased to such an extent that they got out very little wash-dirt. That little, however, yielded over 2 ozs. of gold. In order to overcome the water they formed themselves into a company, with a capital of 2000*l.*, in 16 shares. Early in 1867 they imported from Victoria a 12-horse power steam-engine, winding gear, and a lift-pump of 8 in. in diameter. They believed that this machinery would be ample to keep down the water. A new shaft was sunk, and the machinery set to work in June, 1867. They soon reached the same stratum touched in the first shaft, and obtained a very satisfactory prospect. They sank 10 ft. below this stratum for a pump well, and began opening out their ground. This new shaft was further into the Flat than the first one, and the stratum containing the gold was found at 110 ft., being 6 ft. deeper than the first shaft. The dip of the ground was found to be at the rate of 1 in 20. The company followed out the ordinary plan of opening out claims in the locality—that is, they put in a series of main drives from the shaft, on the same level as the wash-dirt, to the boundary of the claim. When the Star Company got to their boundary there was open communication from one end of the Flat to the other; and as they were in the deepest ground the whole of the drainage poured into their claim and taxed the power of their pumping machinery to the utmost. Other misfortunes followed. First the whole Flat was flooded by Jones Creek bursting through a dam during a heavy thunderstorm. When this damage was repaired, another flood occurred through a party of miners breaking into the Jones Creek underground tail race, constructed at joint expense, to drain off the water which got into the Flat from Jones Creek and the adjacent terraces. The Star Company refused to carry on the drainage of the Flat at their own expense any longer. This compelled joint action. A drainage board, empowered to levy rates, was formed, and subsequently a public company, with a capital of 6000*l.*, to procure steam pumping machinery. The board agreed to allow the company working expenses, and a sufficient amount weekly to pay back the capital invested in three years, with 12 per cent. interest. A shaft was sunk down to the water level, and the following machinery erected on Jan. 1, 1870.—Two steam-engines—one of 60-horse power nominal, and one of 30-horse power nominal; two lift pumps, and one 15-in. plunger, together with 500 ft. of 14-in. pipes, &c. This machinery proved sufficient to overcome the water: gold in large quantity was obtained, and in some of the claims the third, fourth, fifth, and sixth bottoms were reached. The Drainage Board, however, failed to carry out their agreement with the Drainage Company; the latter, having expended their capital, and borrowed money on the strength of that agreement, were plunged into financial difficulties, and soon had to give up working. All the claims were soon flooded, and operations had to be stopped. The drainage plant was sold, the purchaser being Mr. Michael Cassius, the owner of one of the richest claims. He entered into negotiations with the Morning Star and Excelsior Companies to amalgamate and form a new company, with a capital of 16,000*l.*, to work the drainage plant in a more systematic manner. The negotiations, however, never resulted in anything. The Flat remained flooded and unworked for some time, and in accordance with law the Government declared the mining leases of the companies cancelled.

As showing the richness of the claims on the Flat, it will be interesting to note the following statement of the amount of gold obtained from the Cassius, Morning Star, and Excelsior claims from Sept. 1, 1871, until the stoppage of the drainage engine in 1872.

The Cassius claim worked 35 weeks and four days; the Morning Star, 34 weeks; and the Excelsior, 27 weeks and five days. The amount of gold obtained was:—

	Ozs.	dwt.	grs.
Cassius claim .....	4,722	11	17
Morning Star .....	4,094	6	24
Excelsior .....	2,726	11	5

Total yield .....

Taking the average working period of 32½ weeks, these companies thus obtained a return of 366 ozs. 9 dwt. 5 grs. per week. The whole area worked by these companies since 1867 did not exceed 7 acres.

The ground lay unworked from 1872 until about 1881. During the interval many projects were mooted for draining the Flat, and I will now refer to some length to one which formed the basis of the Ross Gold Mining Company, whose operations began in 1881. This was to drain and work an area of 40 acres (the Ross Company got a lease of 100 acres) to a level 225 ft. below high water mark. The appliances to drain and work the claim were—Five Government heads of water from Totara and Jones Creek water race, 225 ft. above surface of ground at claim; a new supply pipe 27 chains in length; a shaft 10 ft. by 6 ft., 325 ft. deep; a tail race commencing 75 ft. under surface of ground at shaft, and carried in a tunnel for 46 chains, and in an open cut for 21 chains; a water pressure pumping-engine of 120-horse power; a turbine of 10-horse power for lifting the stuff excavated in the workings—estimated cost, 18,000*l.*

The chief features of this proposal, which distinguished it from any of the methods previously adopted for drainage at Ross, were—First, the employment of water instead of steam as a motive power; second, the construction of a tail-race for the purpose of carrying off the water pumped at a level 75 ft. under the surface of the ground, and so reducing by 75 ft. the height to which all water had hitherto been pumped. By the substitution of water instead of steam power a great reduction would be made in working expenses. The cost of steam had proved almost ruinous—the steam pumping-engines hitherto used at Ross having averaged a cost of 2*l.* 6*s.* per horse-power per week; while the cost of water was estimated not to exceed 4*s.* per horse-power per week. There is also a considerable saving in the superintendence and maintenance of a water-power engine, as compared with a steam-engine.

**COPPER, TIN, AND LEAD IN NEW SOUTH WALES.**—The copper lodes in the colony were first opened in 1858, since which time many thousands of tons of copper ore have been obtained. The copper-producing country covers an area equal to about 4,296,320 acres; but there are enormous tracts of country the exploration of which will increase the area. Some of the lodes at present in work are very large, and the ores yield a high percentage of copper. The most important copper mine in the colony at the present time is the Great Oxley Mine, and it also is the most distant from the seaboard, being 497 miles west of Sydney. Lead ores, chiefly galena, are found in the following and other localities:—Mount Grosvenor, Peel (near Rathurst), Glen Innes, Yass, Woolgarlo (near Yass), Mylora (near Yass), Darby's Run (near Tingha), Brook Creek, Gundaroo, Silverdale (near Bowring), Bookham (in the county of Harden), Ravenswood, Wiseman's Creek, Murrumburrah, Canberra Plains, Winton Mine (at Mitchell's Creek), Bungonia, Peelwood, and near Bombala. The tiniferous, or tin-bearing area in New South Wales is estimated at 5½ million acres, or 8500 square miles. Up to the present, most of the tin has been obtained from the New England District.

#### THE PATENT NUT AND BOLT COMPANY (LIMITED).

The annual general meeting and a special meeting of the proprietors of the Patent Nut and Bolt Company (Limited) was held on Wednesday, at the Queen's Hotel, Birmingham, and was largely attended, the purpose of the special meeting being the consideration of important proposals as to the form of the company's capital. Mr. J. D. WESTON (of Clifton) presided, and among those also present were Messrs. S. De-la-Grange Williams, Robert Howson, A. Keen, E. J. Grice (managing director), and W. F. Jones (secretary). The report and statement of accounts were taken as read.

The CHAIRMAN, in moving their adoption, said that the directors never felt greater pleasure in meeting the proprietors than on that occasion. Their company had been in existence for 21 years, and no stronger assurance could be given of the sound and prosperous condition of the company's concern than would be conveyed to the shareholders by the resolutions for the alteration of capital which would be proposed at the special meeting. The aim of the directors from the very first had been not to pay an outside dividend but to seek to develop and protect the properties of the company, and these things had been done out of the earnings. They had almost rearranged and rebuilt their works, had greatly extended them, and had introduced machinery from time to time, all with the object of increasing their powers of production and the economy of their manufactures. Moreover, after purchasing the colliery in South Wales, they had from time to time spent large sums of money upon it, with the result that it might be regarded as one of the most improved and economical collieries in South Wales. Concurrently with all these things, which had been done for most part out of revenue, they had still to go on carrying large sums to the reserve fund. In 1872 they wrote off from the capital account a sum of money that had been expended in goodwill and patents amounting to 35,000*l.*—(hear, hear)—and since that time they had carried nothing to the capital account, except in 1873-74, when they carried 61,000*l.*, the amount which had been expended in the purchase of the colliery, &c. It was their improvements and economies which had unquestionably enabled them to cope with the depression of the last three or four years, and had shown them that the future was assured. Upon the report and balance-sheet he need say no more than to point out that they owed to their creditors some 9000*l.* less than was owing last year, that their stocks were about 5000*l.* less, and they had invested an additional 5000*l.* on account of the reserve fund during the year. The reserve fund had not only been beneficial to the working of the concern, as enabling them to draw upon their capital for economical purposes, but it had really been the backbone of the concern. It had now arrived, however, at so large a sum that the directors felt that they were doing that which was perfectly right in seeking to appropriate a large portion of it for the benefit of the shareholders, especially as they could do this in such a way as to retain the same working capital in their business. He wished to add, in conclusion, that the earnings of the company had mainly depended upon the energy, the activity, the solicitude, and the foresight of the managing directors—(applause)—and that he did not think too much praise could be accorded to them for the manner in which they had carried on the company's business.

Mr. S. DE-LA-GRANGE WILLIAMS seconded the motion, and it was adopted.

The CHAIRMAN then proposed that a dividend of 10 per cent. should be declared for the past year. He said that, with a paid-up capital of 280,000*l.*, they had paid away in dividends since the formation of the company nearly 450,000*l.*; and, reckoning their investment to have been worth 5 per cent., they had thus, together with a percentage at that rate, returned the whole of their paid-up capital to the shareholders.

The motion was seconded by Mr. S. DE-LA-GRANGE WILLIAMS, and adopted.

The Chairman and Mr. Howson, retiring directors, were re-elected; and Messrs. Carter and Carter having been reappointed auditors, the business of the annual meeting terminated.

The CHAIRMAN, in introducing the business of the special meeting, said they were aware that the nominal capital of the company was 400,000*l.*, and that 280,000*l.* had been paid up, leaving still uncalled a sum of 120,000*l.*. The intention of the directors was to take 120,000*l.* from the reserve, the amount of which was 140,000*l.*, and to appropriate for the benefit of the shareholders a sum of 6*l.* per share, making the whole of the capital paid up. The 400,000*l.* would then be divided into 20,000 ordinary shares of 10*l.* each, and 20,000 preference shares of 10*l.* each. They felt perfectly justified in taking that step, because the position of the company was so firmly assured that they might look to realise in the future a profit equal with that which they had realised for some years past. The sum taken up every year for the payment of a 10 per cent. dividend had been 28,000*l.*. Under the new arrangement the sum taken up to pay 10 per cent. upon the 200,000*l.* of ordinary capital would be 20,000*l.*, and the sum taken up to pay 5 per cent. upon the 200,000*l.* of preference capital would be 10,000*l.*—together 30,000*l.* in excess of their former yearly payment. They were confident that they would prove to have been perfectly justified in incurring the responsibility.

Alterations were then made in the Articles of Association with a view to the proposed change. In addition to such as were absolutely necessary, an alteration was made in the qualification of directors, and these latter were given power, in case of the office of auditor becoming vacant, to fill the vacancy until the next ordinary general meeting. The sum set aside from meeting to meeting for the purpose of enabling the directors to draw cheques was increased from 10,000*l.* to 25,000*l.*, and the quorum of directors reduced from four to three.

The CHAIRMAN then moved, without further comment, a resolution with reference to the appropriation of the reserve fund, to the effect stated above. The resolution contained also a provision whereby preference shareholders might vote in relation to matters affecting their own shares, without having the general power of voting in the ordinary affairs of the company.

Mr. WILLIAMS, in seconding the motion, said that the scheme appeared to him to be a most admirable one. He had heard several persons express favourable opinions upon it, and some friends of his who lived at a distance, and who had embarked property in the company on his recommendation, had written to him to say how highly they appreciated the scheme. Of course it had been wonderfully well thought out, and they owed it, like so much else, for the most part to Mr. Keen. His (the speaker's) friends expressed without one exception, the hope that the policy which had guided them in the past would guide them in the future, and above all things that they should again lose no time in laying by an ample reserve fund, to be used in the first instance for equalisation of dividends. The net result of the change, he might point out, would be that they would get 30*s.* of dividend where they formerly had 28*s.*, and that over and above this they got rid of all liability for further payments. The preference shares they might give to the womankind, or do what they liked with, and be absolutely certain that they were as safe as Consols; and he felt perfectly certain that the ordinary shares would rank as high relatively as they stood before the change was made.

The resolution was carried unanimously.

Mr. JOSEPH PEARSON proposed a vote of thanks to the directors for their able management of the company's affairs, and the unique statement presented to the meeting. They had great reason, he was sure, to congratulate the directors.

Mr. RICHARD WILLIAMS seconded the resolution, and it was carried by acclamation.

The CHAIRMAN, in acknowledgment of the compliment, said that the prosperous state of the company's affairs was to him equally gratifying.

The proceedings then terminated.

A MONUMENT to the late Sir William Siemens, F.R.S., has been placed over his grave in Kensal Green Cemetery. It is the work of Mr. A. Bruce Joy, and consists of a red Aberdeen granite cross, in which is inserted a medallion portrait of the deceased in Greek marble.

#### Registration of New Companies.

The following joint-stock companies have been duly registered:—

**THE CITY CYCLE AGENCY COMPANY (Limited).**—Capital 1000*l.*, in shares of 1*l.*. The object for which this company is established are:—To manufacture, buy, sell, hire, and deal in tricycles, bicycles, and other machines, as the company may from time to time decide upon. The subscribers (who take one share each) are—W. H. Bailey, Summerfield, Eccles New-road, Eccles, engineer; A. G. Bailey, Eccles, engineer; W. A. Bailey, Eccles, engineer; W. T. Lawton, 322, Liverpool-street, Salford, cashier; R. W. Lawton, 14, Park Grove, Cornbrook, Manchester; J. Buckley, City-road, Manchester; J. W. Haworth, 92, Hartington-street, Manchester.

**THE MIDDLESEX BANKING COMPANY (Limited).**—Capital 100,000*l.*, in 9980 ordinary shares of 10*l.*, and 20 founders' shares of 10*l.*. Established for the purpose of carrying on all business usually conducted by bankers, to trade and deal in lending and borrowing money, discounting bills, &c. The subscribers (who take one share each) are—W. Green, iron merchant, 22, Badge-row, Cannon-street; H. Firmin, 31, Lombard-street; W. Walker, 23, Humber-street, Brunswick-square; A. Segsilla, 4, St. Mary Axe; T. Durant, solicitor, 3, Guildhall Chambers, Basinghall-street; T. Anderson, The Terrace, Blackheath; D. O. Murray, 4, Crown Office-row, Temple, Barrister.

**THE MERSEY TRANSHIPPING AND LIGHTERAGE COMPANY (Limited).**—Capital 150,000*l.*, in shares of 10*l.*. The objects of the company are to carry on the business of stevedores, wharfingers, lightermen, and coal merchants, particularly to load, discharge, &c., into and out of or from vessels. The subscribers (who take one share each) are—Duncan Macarthy, 1 Water-street, Liverpool, shipowner; W. H. Potter, Baffin-street, Liverpool, shipbuilder; R. Schelp, 72, Victoria-street, Liverpool, bank manager; F. W. Stavelly, The Temple, Dale-street, Liverpool; David Rollo, Fulton Engine Works, Liverpool; S. Bell Cowl, 35, John-street, Liverpool, shipowner; Samuel Horton, 28, Lightbody-street, Liverpool, chemical manufacturer; A. J. Lehman, Oriel Chambers, Liverpool, civil engineer.

**SHAW, JARDINE, AND CO. (Limited).**—Capital 200,000*l.*, in shares of 50*l.*. To acquire the goodwill, trade marks, privileges, plant, apparatus, goods manufactured, and the raw and other material and stock-in-trade of the business of cotton-spinners now carried on by James Jardine and James Oliver, of Manchester, cotton-spinners. The subscribers (who take one share each) are—James Jardine, Manchester; James Oliver, Manchester; James A. Dyson, Manchester; Jno. R. Oliver, Manchester, Edward Oliver, Manchester; Robert Grierson, Manchester, cotton spinners; W. Wycliffe Barlow, Manchester, barrister.

**STANDFIELD AND COMPANY (Limited).**—Capital 12,000*l.*, in shares of 5*l.*. To enter into agreement with John Edwin Standfield for the purchase of his business as a coach and carriage builder and saddle and harness maker at Exeter, and to develop these businesses in all their branches. The subscribers are—W. Alford, Crewkerne, Somerset, solicitor, 4 shares; John Goodland, Bystock-terrace, Exeter, 4 shares; John Nichols, 22, Paris-street, Exeter, 10 shares; W. H. Doble, 1, Summerland-park, Exeter, 2 shares; Edward Willis, 1, Fern-villas, Exeter, coachbuilder, 8 shares; John Radford, 5, Parr-street, Exeter, 10 shares; J. H. Stoneman, 4, Summerland-street, Exeter, carriage-maker, 1 share.

**THE LONDON OPEN STOCK AND SHARE EXCHANGE (Limited).**—Capital 50,000*l.*, in shares of 5*l.*. The purposes of this company are to carry on the ordinary business of stock and share dealers, jobbers, and brokers in all transactions relating to the sale, transfer, or exchange of every description of stocks, shares, debentures, and other securities or investments for money. The subscribers (who take one share each) are—Henry Reynolds, 20, Great Winchester-street; W. D. Sewell, 126, Edward-street, New Cross; F. E. Hodges, 26, Maida Vale; J. Cocker, 30, Kerry-road, New Cross; W. Richards, 144, Camberwell Grove; R. Richards, Bellevue House, Camberwell, shipowner; G. Chapman, 20, Great Winchester-street, stock jobber.

**THE ESSEX LAND AND GOLD MINING COMPANY (Limited).**—Capital 500,000*l.*, in 1*l.* shares. The objects for which this company has been formed are—To enter into and carry on the arrangements prepared between E. R. Philpotts of the one part and the company of the other to purchase, &c., settle, and cultivate lands in the Transvaal and elsewhere in South Africa, for the purpose of developing their resources by building, planting, mining, also to stock the said lands, and breed and deal in all kinds of cattle, &c., also to make rail and tramways, telegraph wires, &c. The subscribers (who take one share each) are—C. H. Austin, 20, Connaught Terrace, Wandsworth; A. Taylor, 3, Hendy's Cottages, Boleyn-road, Upton, Essex; Wm. Cartwright, 20, Leyton Park Road, Leyton, Essex; C. Edward Soane, Scottish Club, Dover-street, Piccadilly; A. J. Lithgow, 19, Millman-street, Bedford-row; W. L. Thompson, 107, Cannon-street, engineer; C. D. Hume Beckles, 25, Abchurch-lane, E.C.

**THE PHOENIX MINING COMPANY (Limited).**—Capital 25,000*l.*, in shares of 1*l.*. Established for purpose of mining, leasing, or otherwise acquiring mines and mineral properties in Norway or elsewhere, or any estate or interests in, or rights over, any mine or mineral properties deemed necessary. The subscribers are—Ashley Ponsonby, 9, Prince's Gardens, 100 shares; Robt. Milburn, Beckenham, Kent, engineer, 198 preferred shares; Jno. White, jun., 103, Tulse Hill, 202 preferred shares; Hy. Jno. Leslie, 4, Coleman-street, chartered accountant, E.C., 34 preferred shares; H. Geo. King, 4, Coleman-street, chartered accountant, 34 preferred shares; Tom Mundy, 25, Colfe-road, Forest Hill, 1 share; Roman D. Yonge, Clifton Villa, Brixton.

**THE EASTBOURNE OMNIBUS AND CARRIAGE COMPANY (Limited).**—Capital 30,000*l.*, in shares of 5*l.*. To act as omnibus, cab, carriage, livery stable, and van proprietors, and generally to carry on the business of common carriages. The subscribers (who take one share each) are—W. Taylor, captain, Glendleigh House, Hastings; E. Napier, lieutenant-colonel, 7, Hyde Gardens, Eastbourne; W. A. G. Taylor, Hailsham, Sussex; Samuel Marsh, Lewis Villa, Eastbourne, accountant; F. G. Powell, lieutenant R.A., Eastbourne; J. M. Kimber, builder, 102, Terminus-road, Eastbourne; E. Stamp, 11, Queen Victoria-street, E.C.

**ST. AUGUSTINE DIAMOND MINE (Limited).**—Capital 315,000*l.*, in shares of 1*l.*. The objects are to purchase, lease, or otherwise acquire, settle, and improve, &c., certain lands in Griqualand West, South Africa; also for the purchase of certain mines and rights in Griqualand West, South Africa. The subscribers (who take one share each) are—Edward Butler, Park-square, Leeds, solicitor; Jas. Lakeman, Imperial Buildings, Bond-street, Leeds, accountant; Geo. Graham, Pontefract, accountant; Henry Oliver, jun., 2, Albion-place, Leeds, accountant; W. Henry Thomlinson, 33, St. Michael's-road, Headingley, Leeds, solicitor's clerk.

The death is announced of the eminent Russian geologist, George Helmersen, at the age of 82. He studied at Dorpat under Engelhardt, whom he accompanied on his scientific journey along the course of the Lower Volga and the Ural. He subsequently took part in Hofmann's and Humboldt's explorations of the Ural region. Having completed his studies, especially in mineralogy, he spent some years, by direction of the Russian Government, in geological travels through Germany, Austria, and Switzerland. In 1835 he was aggregated to the body of mining engineers, and appointed director of studies at the Mining Institute in St. Petersburg. During leisure periods he carried out a series of important geological journeys over the Kirghiz Steppe, through Norway and Sweden, the coal districts of Poland and Silesia, the mining districts of Lakes Onega and Peipus, and the bituminous coal region in the Governments of Kher-sovsk and Kiev. He also thoroughly explored the gold mines at Bere-sovsk, and traced the course which has been followed in making the Ural Railway. The results of his indefatigable industry have been published in numerous memoirs of the Russian Academy of Sciences and other works.



## BOILER FURNACES.

An interesting and thoroughly practical paper on the above subject was read by Mr. SAMUEL BOSWELL, of Manchester, at the meeting of the Manchester Association of Employers and Foremen, held on Saturday last.

The PRESIDENT (Alderman W. H. Bailey) introduced the lecturer by observing that Mr. Boswell had had considerable experience in the construction and working of boilers both at the well-known works of Messrs. Galloway, and by his connection with the Manchester Steam Users' Association. To his mind, Lancashire people, and the North of England generally, were largely indebted to such men as Mr. Fletcher and Mr. Longridge, and to associations like their own for the influence they had exerted in bringing about a better construction and working of steam-boilers.

Mr. BOSWELL, in the course of his paper, which was illustrated by numerous diagrams, said boiler furnaces were divided into two distinct classes—"external," or those which were separated from the boiler, and "internal," or those which were contained within the boiler itself. The boilers which had external furnaces were, no doubt, right from a theoretical point of view, the fire lying at the lowest part of the vessel tending to give a perfect circulation, but they were practically a failure, except under special conditions, such as clean water, easy firing, or where waste gases were used in lieu of raw fuel, of which they were very wasteful, owing to the great loss by radiation from the furnaces, sides, &c. Consequently the internal flue, from which there was very little loss by radiation, was the most suitable for general work. The internal flue was almost invariably made circular, of such a diameter as to be sufficiently strong to resist the collapsing pressure, and large enough to enable an easy handling of the fire, so as to work economically and consume the smoke; its position had also to be convenient for attention to the fire-bars, ashes, &c., and to allow a ready adjustment of the firegrate and bridge to suit the requirements of the flue. Bridge walls should never be too high, as the gases, being drawn through a contracted opening, were liable to pass away, only partly consumed, and the flame was somewhat prematurely cooled, whilst some of the plates were liable to become overheated by the flame impinging upon them too severely. Efficiency, economy, and immunity from the smoke nuisance were best achieved when there was plenty of boiler-power at hand. Although cast-iron and copper possessed numerous advantages over other metals they also had their disadvantages, and as they were now seldom used except for special purposes, he would pass on to deal with wrought-iron, which had, perhaps, been used to a greater extent than any other material for boiler furnaces, but he did not think it would long remain in general use, as it was being fast superseded by mild steel, manufactured specially for boiler furnaces. In the selection of iron for boiler construction he recommended that only the brands of the well-established houses should be used, and he might add that it did not necessarily follow that iron, which would carry the required load in tension, was the best for furnace construction, as ductility and tenacity were of great importance, and any material that showed the slightest trace of failure, owing to workshop manipulation, should at once be cast aside as unfit for boiler purposes. It had been erroneously supposed that, seeing the material is under a compression, almost any brand would do, but this was a fallacy, as a boiler furnace was never put to the test until such a case as shortness of water occurred, when, with any margin of safety, however great, it was certain to lose its strong circular form and become subject to a tensile bending and overheating strain, and unless the material was very tenacious and ductile it would rupture, as was often the case, with fatal results. Seeing that the improvement in the manufacture of iron could scarcely be said to have kept pace with the increase of pressure used, they would have to turn their attention to the more suitable material, which was provided in mild steel. A few of the advantages of steel, in addition to its tenacity and ductility, were its freedom from blisters or lamination, which were seldom seen, or when they did occur, were generally found to be very slight and unimportant. It was now made as homogeneous, and if it might be said to have any fibre, this ran equally in all directions. The percentage of carbon was also so low and so well controlled that it was now easily welded and worked by men when once they became accustomed to handling it, whilst it might be purchased at half the cost of such brands as Low Moor. But all its advantages were entirely lost when it was badly handled, and it became less reliable than common iron; first-class boiler makers, however, seldom used any other material for furnaces. Perhaps the strongest form of boiler furnace was the circular form, as well as the most convenient for making and working, as any portion could at any time be easily gauged for distortion; but when a flue was immersed in water, as in a boiler, there was a tendency, from its buoyancy, to rise at mid length, and so lose its circular form, becoming oval major, a/s horizontal. This might account for weak flues collapsing top and bottom, as was often seen; but as few furnaces were now made without some kind of expansion or anti-collapsing seams which would take up this movement and so strengthen the flue, the duty of calculating the strength was now dispensed with. In construction the best seam for the longitudinal direction was the welded seam; but as the circular seams had to take up and give out expansion and contraction in different directions, as well as to be of such a form as to strengthen the flue against collapse, they must consider what was the best seam out of a number now available. The lap joints would allow a circumferential expansion and contraction, but not a longitudinal one, and it was very seldom used; the T was very rigid, and of no use except to strengthen against collapse, as it restricted freedom in all directions; the flanged seam would take up and give out expansion and contraction in a longitudinal direction, only restricting the circumferential expansion in the same degree as it resisted the collapsing pressure; the Bowling hoop and also the Hawkesley-Wilde flange, would yield to expansion and contraction in any direction, but like all the before-mentioned seams possessed one inherent defect, which was that when repairs were required the front end plate had to be cut away to withdraw the furnaces. To overcome this difficulty he (Mr. Boswell) had designed and patented a furnace and seams which would resist collapse, yield to expansion and contraction, and could be readily withdrawn from the boiler without the removal of the front end plate or fittings, whilst at the same time an effective heating surface was secured, and no costly construction was involved. The chief feature of this design, which was exhibited on diagram, was that a conical form was given to each section of the flue. Mr. Boswell then proceeded, that in working care should be taken not to try to get a greater amount of work out of a boiler than it was capable of giving with efficiency, for although as much as 30 lbs. of coal per square foot of grate could be consumed it was more economical to work at about 20 lbs. per square foot, when it could be properly and fully consumed. Care should be taken to adopt means to prevent loss of heat by radiation, especially from the front end plate, for front plates exposed to a piercing atmosphere with furnaces heavily fired had been known to give trouble and require repairs after a very short career, owing to the extreme limits of expansion and contraction; and as the furnace was liable to suffer from the failure of some minor detail or fitting a good reliable fusible plug or low-water valve should be applied. The amount of deposit was not always a guide as to the suitability or otherwise of the feed water; peculiar character was of more importance than quantity, as 1-32 thickness of some kinds of deposit would cause more trouble than half an inch of others, those containing lime in carbonates generally being the worst, particularly when grease was present in the feed water. Steam users were occasionally unduly alarmed at the appearance of some slight blister, fracture, or other defect, and at once sent for some local boiler maker; this, however, was often a mistake, and boiler makers had been known to renew a plate when perhaps one hour's caulking or dressing might have served to leave the boiler in a safer and better condition than after the application of a new plate. Although the working boiler maker might be qualified to do a good repair, he was not always qualified to advise, and the best and cheapest course for a steam user was to call in the insurance company's inspector or a firm of boiler makers who kept a qualified inspector, so that the repairs might be done

efficiently and cheaply. Inspectors were often called in to test boilers after repairs, which were found to be quite unsuitable to their requirements, whereas if an inspector had been called in at first the repairs might have been more satisfactory at a much less cost, whilst the workmanship could not be doubted. In conclusion, Mr. Boswell said the object of his paper had not been to give a theoretical exposition, but to lay before the members a few facts and practical suggestions which had occurred to him during his avocation as boiler maker and inspector.

The PRESIDENT said they had never had a more practical paper before the society. The scientific treatment of boilers had not been much thought of until a comparatively recent period. Until a few years back almost anyone could be a boiler maker; but now, in that district, at least, boiler makers carried on their business on thoroughly scientific principles.

Mr. T. ASHBURY, C.E., in proposing a vote of thanks to the reader of the paper, said that district was pre-eminently a boiler making district, and they could not anywhere in the world within a radius of 20 miles find so many practical and first-class boiler makers.

Mr. Councillor ASQUITH, in seconding the motion, remarked that there need be very little trouble with the smoke nuisance if they had plenty of boiler room, but scarcity of boiler room was one of the defects in the warehouses of Manchester.

The vote of thanks was unanimously passed, and the proceedings closed.

## FOREIGN MINING AND METALLURGY.

The condition of the French Iron Trade continues unfavourable. Prices have shown no tendency towards a revival, and notwithstanding the existence of an understanding between the foremasters of the Nord, there is little probability of business being done in iron above 51. 8s. per ton. The imports of iron minerals into France in January amounted to 58,228 tons, as compared with 100,984 tons in January, 1884, and 118,104 tons in January, 1883. In these totals Spanish iron minerals figured for 41,662 tons, 31,128 tons, and 23,632 tons respectively. The exports of iron minerals from France in January were 460 tons, as compared with 6886 tons in January, 1884, and 2527 tons in January, 1883. There is little intelligence to communicate with respect to the German iron trade; weakness is observable in almost every branch—from pig to plates and from wire to steel. Rails have been well maintained, as well as other products of the steelworks. At Altona the Gattehoffnung and Osnabruck Works have shared an order for 1180 tons of steel rails at 71. per ton. Locomotive tyres have been contracted for at Cologne by several steelworks at prices ranging between 111. 11s. and 111. 16s. per ton. New works have just been established at Castellemare de Stabia (Italy) for the production upon a large scale of iron for building and naval purposes. The production of steel in Belgium in the second half of last year was 75,947 tons. The production for the first half of the year having been 71,375 tons, the output for the whole 12 months was 147,322 tons, as compared with 156,301 tons in 1883.

An adjudication of 9200 tons of steel rails has just taken place in Belgium, and has attracted a certain amount of attention. French competition had been feared, but the only foreign tender received came from Aix-la-Chapelle, and this tender was about 8s. per ton higher than the average indicated by the tenders of Belgium firms. Annexed is a list of the tenders delivered:—John Cockerill Company, 2700 tons, at 51. 3s. 2d. per ton; Angleur Works, 2700 tons, at 51. 3s. 2d. per ton; Ougrée Works, 1000 tons, at 51. 3s. 10d. per ton; Thy-le-Chateau Works, 2000 tons, at 51. 3s. 11d. per ton; La Louvière Works, 1000 tons, at 51. 4s. per ton; Angleur Works, 3000 tons, at 51. 5s. 8d. per ton; and works at Aix-la-Chapelle, 9200 tons, at 51. 12s. per ton. The last previous adjudication of steel rails for the Belgian State Railway took place in July, 1884, and the quantity of rails then tendered for was 14,000 tons, which were taken at an average of 51. 4s. 10d. per ton. These figures show that steel rail prices have experienced no material change in Belgium during the last seven months, although the tendency has been, upon the whole, slightly downwards. The production of pig in Belgium in the second half of last year is returned at 360,609 tons. The corresponding production in the first half of last year having been 377,496 tons, the production for the whole year was 738,105 tons (these figures are subject to future revision). The definitive production of 1883 was 783,433 tons. The production of iron in Belgium in the second half of last year was 238,063 tons. The corresponding production in the first half last year having been 230,122 tons, the production for the whole year was 468,185 tons.

A strike among the coalminers of the Borinage has attracted a certain amount of attention in Belgium, nearly 15,000 men having gone out. Good order has been maintained thus far, and hopes are entertained that the difficulty will be adjusted without any breach of the peace. The temporary absence of deliveries from the Borinage has been made good by increased supplies from other sources.

The Belgian coal markets have experienced generally no change in tone, except that household coal has been scarcely so well supported. Coking coal has continued in little demand, as the production has, however, been a good deal reduced. A little more firmness has been observed in the Centre; the coal production of Belgium in the second half of last year is officially returned at 9,030,866 tons, as compared with 9,010,695 tons in the first six months of the year. It follows that the production for the whole of last year was 18,041,561 tons (this total is subject, however, to further revision). The definitive production of 1883 was 18,177,754 tons. Prices have continued to be pretty well maintained upon the German coal markets. Coal for metallurgical purposes has continued weak; but, on the other hand, industrial coal and gas coal have been in pretty good demand. The movement of coal over the railways accommodating the basin of the Ruhr was 84,430 tons per day in the first fortnight of February. The corresponding movement in the corresponding period of February, 1884, did not exceed 74,640 tons per day.

## SAFETY-LAMP EXPERIMENTS.

Some two years since experiments, with the object of testing the capabilities and efficiency of the various safety-lamps in use, were commenced at Aldwarke Main Colliery, near Rotherham. The apparatus then used being much enlarged and improved, a series of experiments were conducted by a committee acting on behalf of the Midland Institute of Mining Engineers. The results of these experiments were placed before the members of the Institute very fully, and there is not the slightest doubt they form the most valuable data upon the subject of safety-lamps that has hitherto been brought before the mining community.

The improved apparatus consists of a series of piping, large enough to allow a safety-lamp to stand upright in, connected to a gasholder at one end and to a steam-jet at the other. It is so arranged that lamps can be placed in it in any position, so as to allow the current to impinge horizontally, vertically, or obliquely upon them. The velocities are obtained by means of the steam-jet and the proper mixture of gas and air, so as to arrive as near as possible at the highest explosive point, is got by weighting the gasholder. The measurements of the currents are taken by an anemometer, expressly constructed for registering high velocities, by Messrs. Davis and Son, of Derby. Experiments have been made with all sorts of lamps and continue to be made, and it is hoped that they may be the means of obtaining a better lamp than any that is at present before the public.

In order to impress upon the workmen and officials employed at the Aldwarke Main Colliery the advantages of the new lamp which has recently been introduced, and the disadvantages and dangers attending the old lamps, such as the Davy, Clanny, Williamson, and Stephenson, Mr. Rhodes (the manager) recently gave a series of experiments before a large number of them. He first explained the principle of the Davy lamp, and showed that it would fire, although comparatively safe in a still atmosphere, the surrounding gas in a velocity of 5 ft. to 6 ft. per second. He also showed that the Clanny, Williamson, Stephenson, and ordinary Mueseler lamps all failed in velocities varying from 7 ft. to 17 ft. per second.

With regard, however, to the Mueseler lamp he explained that the safety of this type of lamp depended in a great measure upon the size and proportions of the cone or chimney, and that the lamp which was known as the Protector Mueseler seemed to have a cone of a more suitable size or dimensions than any other class of Mueseler lamp. This lamp, he said, would stand very severe tests until the gas was caused to impinge upon it in an uphill direction, thus causing a vacuum over the top of the cone or chimney, and the flame to be drawn up it, when it fired the surrounding atmosphere.

He next went on to show them the most recent improvement in safety-lamps—the application of a shield or cuirass round the gauze of an ordinary Mueseler lamp. The effect of this shield, he said, was to give the lamp complete immunity from the effect of almost any current, and to enable it to withstand tests in an explosive mixture of enormous severity. This was the lamp used at the Aldwarke Main and Car House Collieries. He submitted it to tests ranging from 20 ft. to 50 ft. per second velocities in their pressure, and it stood these tests without a single failure.

Mr. Rhodes said that there appeared to be considerable doubt as to who really was entitled to the credit of having invented or brought into use the outside shield or covering. He was informed that many years ago a shield of this class was in vogue (if it was it was never brought forward prominent before the public as an additional source of safety), and the credit, if any, of introducing this shield as a *quæ non* appeared to him to belong to Mr. W. Smethurst, because no lamp when the experiments first commenced was sent to him fitted with this appliance except from Mr. Smethurst. This shield applied to any ordinary lamp increases enormously its safety; but as applied to the Mueseler lamp it seemed to him to more nearly reach what was wanted in a safety-lamp than in any other lamp he had seen.

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HYDRAULIC MINING IN CALIFORNIA, WITH EXPLANATIONS CONCERNING THE ORIGIN OF GOLD-BEARING ALLUVIUM THERE AND ELSEWHERE.—No. 2.

I will now more minutely describe the actual mining operations:—The mining ground being selected a tunnel is projected from the nearest and most convenient ravine, so that the starting point on the bed rock towards the face of the ravine shall approach the centre of the material to be removed at a gradient of 1 in 10 to 1 in 30. The dimensions of such tunnel are usually 6 ft. in width by 7 ft. in height, and continuing in contact with the hard river bed, for the greater ease of excavation, collection of gold, and conservation of quicksilver amalgam.

These tunnels vary in length from a few hundred feet to a mile, and some of the longer ones occupying from one to seven years in execution, at a cost of from \$10 to \$60 per foot of frontage. The tunnel of the Blue Gravel Company, with length of 1358 ft., cost in labour alone \$70,000, but it could now be driven for \$35,000, as skilled labour is cheaper now than then. The grade in this tunnel is about 12 per cent., and the end of the tunnel is designed to be 170 ft. of elevation, and reaching to a point beneath the surface of the gravel which is being operated upon, and where a shaft or incline is sunk to or through the bed rock or gravel until it intersects the tunnel. The object of this laborious operation is obvious as the long tunnel becomes a sluiceway, and through the whole length of which sluice-boxes are laid, for the double motive of carrying off the material and saving the gold, and for this purpose a trough of strong planks is placed in the tunnel 2½ ft. wide, and with sides high enough to contain the stream. The pavement of the trough is generally laid of blocks of wood 6 in. in thickness, cut across the grain, and placed on their ends to the width of the sluiceway. The wooden blocks are usually alternated with sections of stone pavement, the stones being set endwise, and in the interstices between the stones and wooden blocks quicksilver is distributed, and as much as 2 tons of this metal is required to charge a long sluice. The water in the canal is brought by aqueducts or other means to the head of the mining ground, having an elevation of 100 ft. to 200 ft. above the lowest level of the mining ground, and is finally conveyed to it by iron pipes, sometimes sustained on a strong incline of timber.

These pipes are of sheet iron of adequate strength, rivetted at the joints, and measure from 12 to 20 in. in diameter, and communicate at the bottom with a strong prismatic box of cast-iron, on the top and sides of which are openings for the adaptation of flexible tubes, made of very strong fabric of canvas, strengthened by cording, and terminating in nozzles of metal of 2½ to 3 in. in diameter. From these nozzles the streams of water are directed against the face of the gravel to be washed exercising an incredible effectivity.

The volume of water employed varies of course with the work to be done; but it is not uncommon to see four such streams acting simultaneously on the same bank, each conveying from 100 to 600 in. of water per hour—1000 miners' inches being equal to 106,600 cubic feet of water per hour, constantly exerting its force under a pressure of 90 to 200 lbs. to the square inch, varying with the height of the column.

Under the continuous action of this enormous force, aided by the softening power of the water, large sections of the gravelly mass are dislodged, and fall with great violence, the debris speedily disintegrating and disappearing under the resistless force of the water, and is hurried forward in the sluices to the mouth of the shaft, down which it is precipitated with the whole volume of turbid water. Boulders of 100 to 200 lbs. in weight are dislodged and shot forward by the impetuous stream, accompanied by masses of the harder cement which meet in the fall, and by the concussion from the great boulders the crushing and pulverising agency required is found to disintegrate it. The heavy banks, of 80 ft. and upwards, are usually worked in two benches, the upper never being so rich as the lower, and also less firm, and therefore worked away with greater rapidity.

The lower section is much the most compact, as this stratum on the bed rock being strongly cemented resists great pressure, and even sometimes the full force of the streams of water, until it has been loosened by gunpowder or other explosives. For this purpose adits are driven in on its foundation point of from 40 to 70 ft. and more from the face of the bank, and drifts are extended at right angles therefrom to a short distance on each side of the adit, and in these drifts a large quantity of gunpowder is placed (from 1 to 3 tons), and fired at one blast, having been previously built in with masonry. And in this manner the compact conglomerate is broken up, and then the water easily completes its work. Sometimes in the soft upper strata the system of tunnels is extended as in a coal mine by cross alleys, leaving blocks which are afterwards washed away, and then the whole mass settles, and is disintegrated under the influence of water. The wooden sluices in the tunnels already described are often made double for the convenience of cleaning up one of them whilst the other remains in action. The process of cleaning up is performed according to the quantity and richness of the material worked upon at intervals of 20 to 40 days, and consists in removing the pavement and blocks from the bed of the sluice, and then gathering all the amalgam of gold and rich dirt collected, and replacing the blocks in the same way as at first. Advantage is taken on this occasion to reverse the position of the blocks and stones when they are worn irregularly, or substitute new ones for those which are worn through. The mechanical action of the washing process on the blocks is of course very rapid and severe, requiring complete renewal of them once in eight to ten weeks. Some miners prefer a pavement of egg-shaped stones set like a cobble-stone flooring, the gold being deposited in the interstices. Most of the sluiceways are, however, paved with rectangular wooden blocks, with or without stones as described. Standing at the mouth of one of the long tunnels in full action, any person unaccustomed to the process is struck with astonishment, amounting almost to terror, as the muddy mass sweeps onward, bearing in its course the great rolling boulders, which add their din to the roar of the water, the whole being precipitated down a series of falls, at each of which it is caught up again by new sluices of timber, lined like the first, and so onwards and downwards many hundreds of feet until the level of the river is reached, at a distance of about a half mile or more from the mouth of the first tunnel.

At each of these new falls of 25 to 50 ft. the process of comminution begun in the first shaft is carried on, and a fresh portion of gold obtained. Rude as this plan of saving gold appears to be, more gold is procured by it than by any other method of washing yet devised for this process of work, as it would be impossible to handle such vast quantities of material in any other way, and we can compare the cost of washing and handling a cubic yard of auriferous gravel by it as follows:—

By manual labour with the pan ..... \$15 00  
" " with rocker ..... 3 75  
" " with the long tom ..... 0 75  
By the hydraulic process ..... 0 22

But the system even if effective or profitable as a mining operation is prejudicial to the interests of the general public, as the vast quantity of material which it so suddenly removes is merely shifted into the shallows beneath, to be re-distributed by every freshet to points lower and lower down until it reaches the sea-coast, creating bars at the mouths of rivers in its course, and changing the hydrography of harbours—as it has done with the Bay of San Francisco by its silt.

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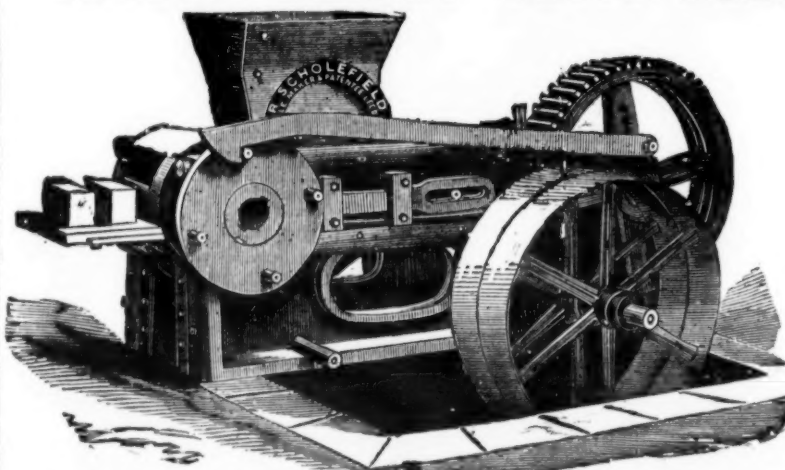
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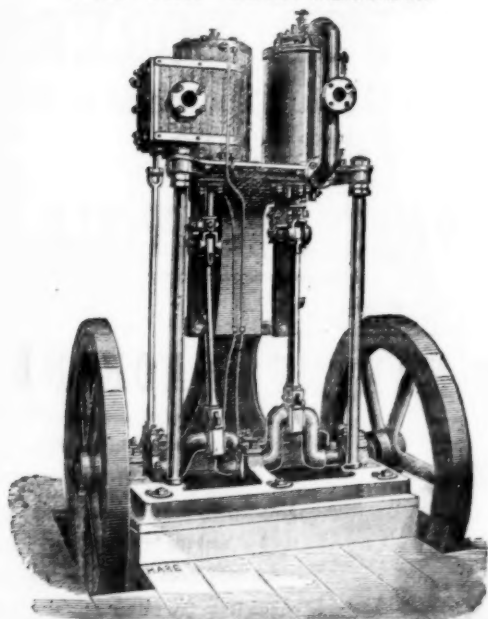
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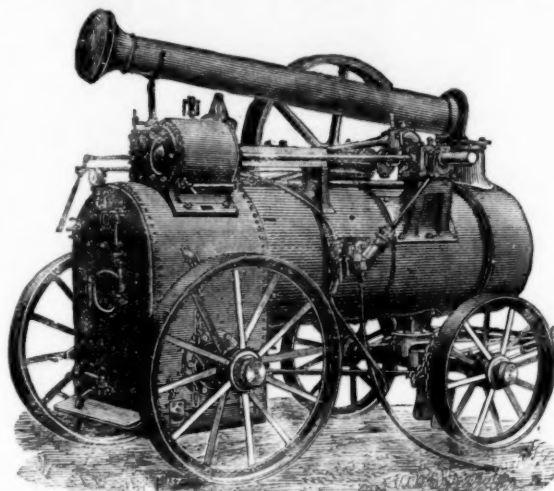
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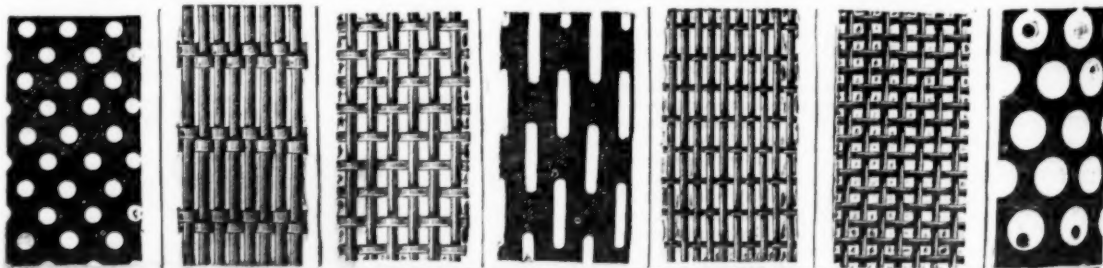
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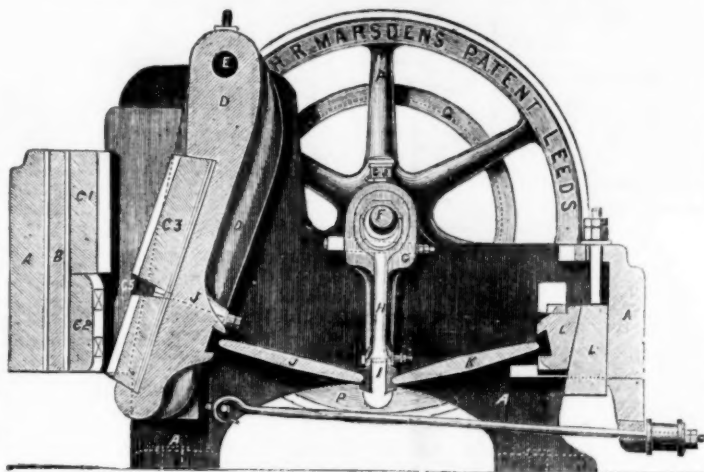
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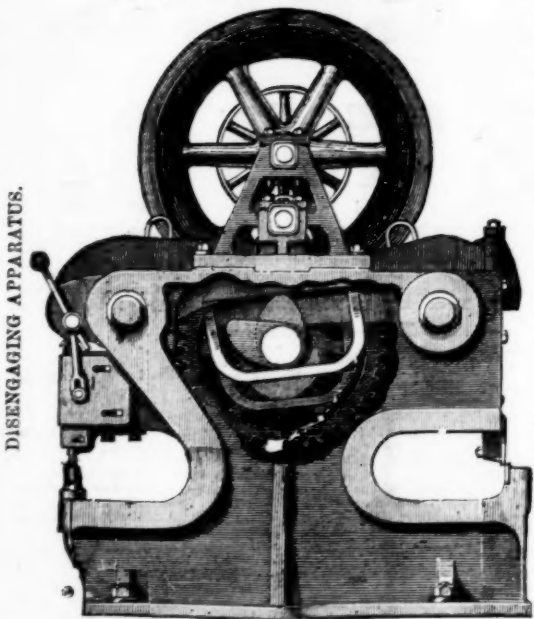
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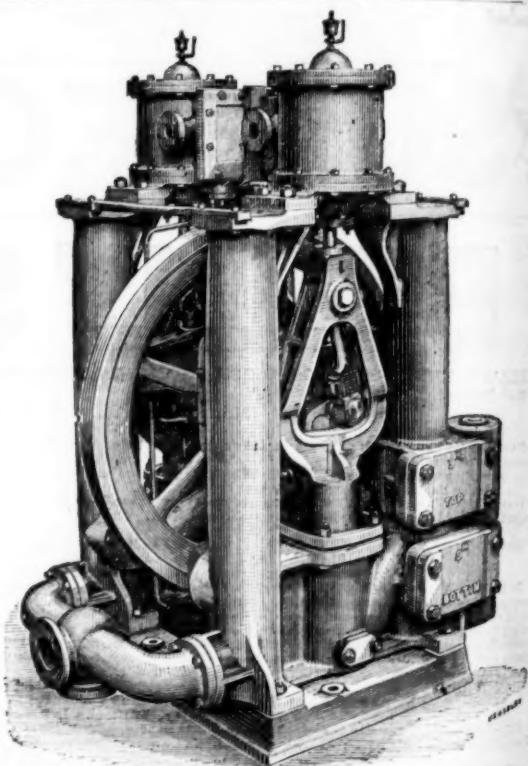
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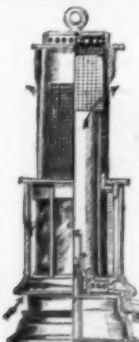
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